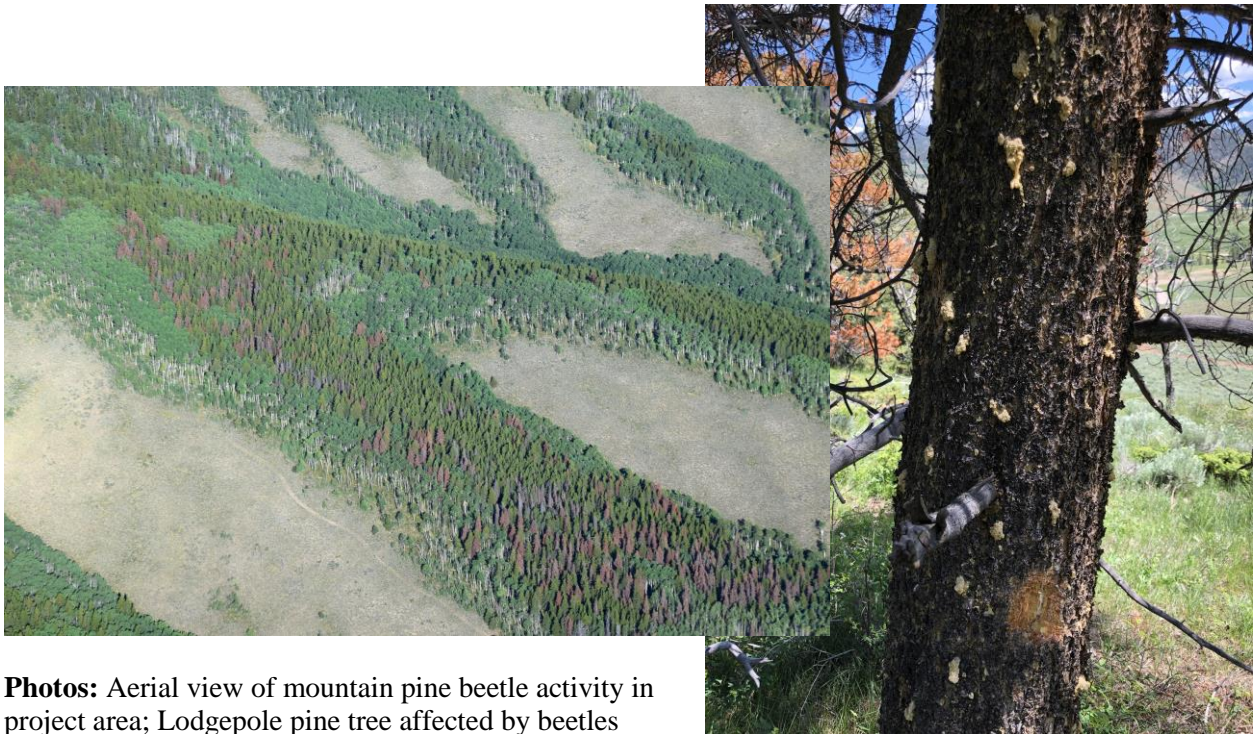


**Wilder-Highlands Mountain Pine Beetle Response Project
Grand Mesa, Uncompahgre and Gunnison National Forests
Gunnison Ranger District**

**Biological Assessment
April 14, 2020**



Photos: Aerial view of mountain pine beetle activity in project area; Lodgepole pine tree affected by beetles

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Contents

Introduction	3
Project Location	3
Purpose of Project.....	5
Project Description.....	5
Action Area for Effects Analysis	14
Gunnison sage-grouse (GuSG)	14
Canada Lynx	15
Analysis Method	15
Threatened, Endangered, and Proposed Species Considered	15
Consultation History	21
Environmental Baseline for Canada Lynx.....	21
Effects Analysis (Direct and Indirect Effects)	29
Compliance with the Southern Rockies Lynx Amendment.....	29
Compliance with SRLA Objectives, Standards and Guidelines.....	29
Direct and Indirect Effects	34
Determinations of Effect and Rationale	38
Environmental Baseline for Gunnison Sage-Grouse.....	38
Life History, Designated Critical Habitat, and Threats Relevant to the Proposed Project.....	38
Environmental Baseline of Gunnison Sage-grouse in project and action area.....	41
Review of the Candidate Conservation Agreement (CCA) for the Gunnison sage-grouse	42
Effects Analysis (Direct and Indirect Effects)	42
Conservation Measures Incorporated into the Project	47
Determinations of Effect and Rationale	47
Cumulative Effects	49
Responsibility for a Revised Biological Assessment.....	50
References	50
Appendix A – Noise Assessment	54
Appendix B – Species List - Colorado Ecological Services Field Office– (File Attached Separately)	58

Introduction

The purpose of this document is to present the analysis and determination of effects of the proposed project on threatened, endangered, and proposed species under the Endangered Species Act. This report conforms to legal requirements set forth under section 7 of the Endangered Species Act (ESA) (19 U.S.C. 1536 (c), 50 CFR 402.12 (f) and 402.14. Section 7(a) (1) of the ESA requires federal agencies to use their authorities to further the conservation of listed species. Section 7(a) (2) requires that federal agencies ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of federally-listed species, or destroy or adversely modify designated critical habitat.

Forest Service policy requires that a review of programs and activities, through an effects analysis document (referred to in current Forest Service policy as a biological evaluation or BE), be conducted to determine their potential effect on threatened and endangered species, species proposed for listing, and Regional Forester-designated sensitive species (FSM 2670.3). Under the ESA, the effects analysis report is called a biological assessment (BA) and must be prepared for federal actions that are “major construction activities” to evaluate the potential effects of the proposal on listed or proposed species and critical habitats. The contents of the BA are at the discretion of the federal agency, and will depend on the nature of the federal action (50 CFR 402.12(f)). A BE may be used to satisfy the ESA requirement to prepare a Biological Assessment. Preparation of a Biological Evaluation as part of the NEPA process ensures that threatened, endangered, proposed, and sensitive species receive full consideration in the decision-making process. For the analysis of effects on Forest Service sensitive species, a separate biological evaluation addressing sensitive species is in the project file and available upon request.

Project Location

The project is located east of Almont, CO, adjacent to the communities of Gunnison Highlands and the Wilder Subdivision on the Taylor River and extending south to Lost Canyon road (NFSR 743.0) in Gunnison County, CO. Elevations range from 8,500 – 10,600 feet.

Legal Description: Sections 32-33, T15S, R 84W, Sixth PM; Sections 7-9, 16-21 & 27-34, T51N, R2E; Sections 12-13 & 24, T51N, R1E, and sections 3-5, T50N, R2E, New Mexico PM.

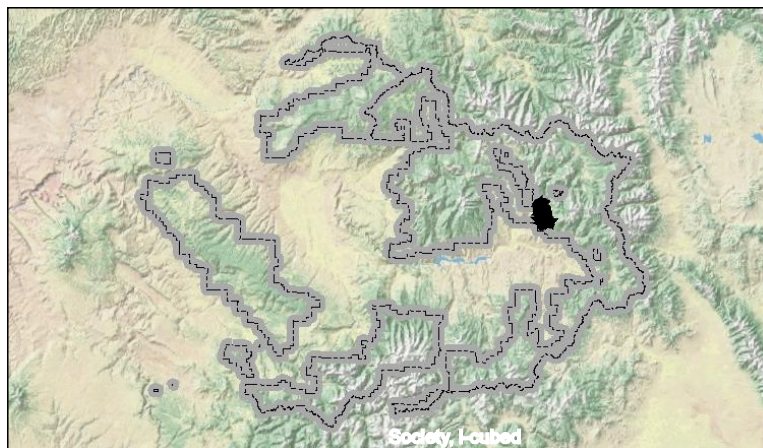


Figure 1. Project location on the GMUG National Forests

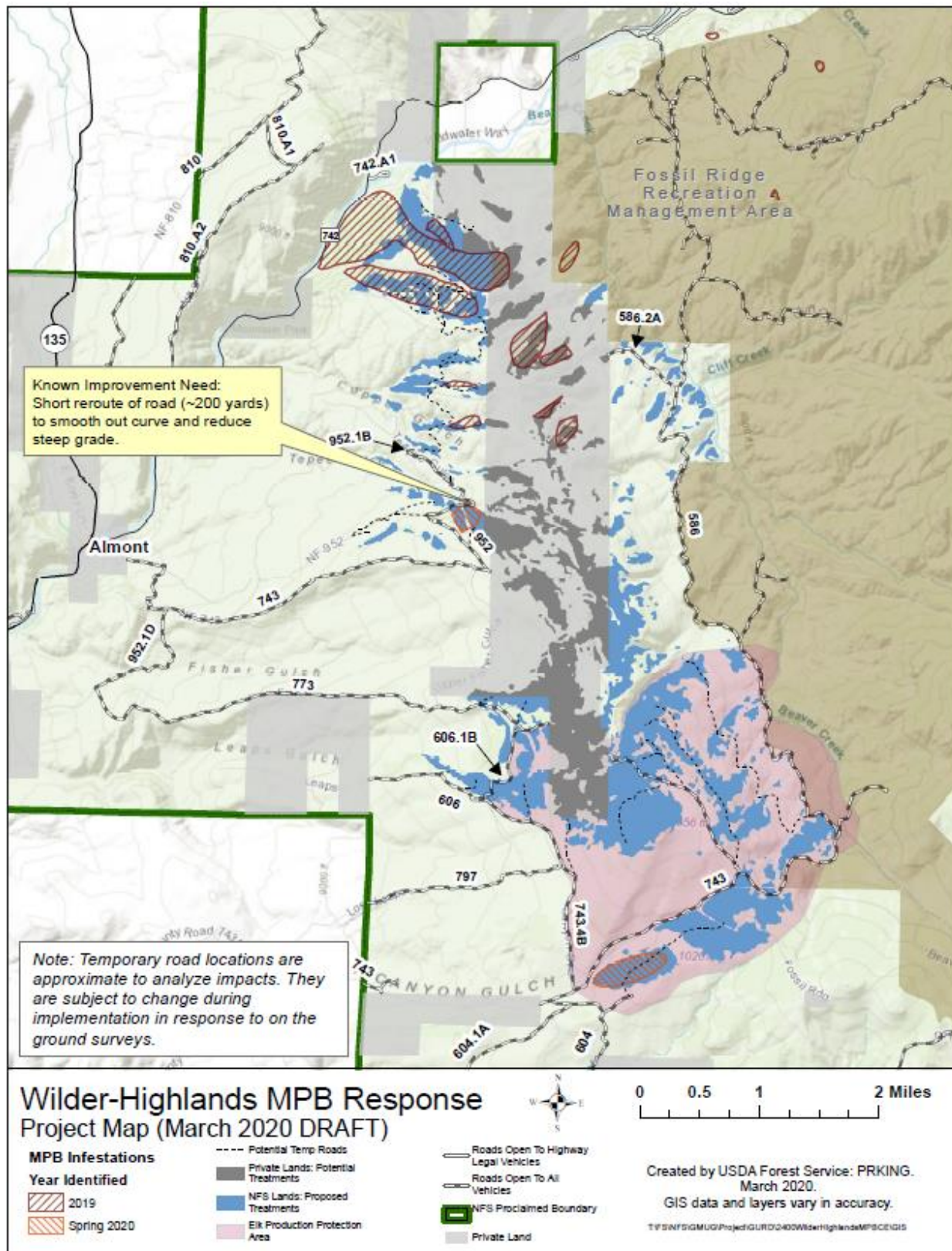


Figure 2. Project map

Purpose of Project

The purpose of the Wilder-Highlands Project is to attempt to mitigate a developing epidemic of mountain pine beetle and prevent a landscape-scale disturbance.

2019 Aerial Insect and Disease Surveys completed in coordination with the United State Forest Service (USFS) Region 2 and the Colorado State Forest Service (CSFS) revealed an emerging outbreak of mountain pine beetle resulting in mortality of lodgepole pine in Gunnison County, Colorado. The presence and intensity of mountain pine beetle activity on approximately 600 acres was confirmed through transects conducted by USFS Forest Health Protection staff in August 2019.

In March 2020, Forest Health, timber, and fuels specialists investigated the reported presence of mountain pine beetle in areas south of the 2019 identified stands. Though access was limited, two new areas with mountain pine beetle were identified (one of the new areas still needs to be confirmed) in the southern portions of the proposed project area.

Adjacent to the 2019 outbreak of mountain pine beetle are 290,000 acres of continuous lodgepole pine dominant stands vulnerable to a landscape scale epidemic. In line with predominant winds from the southwest which could increase dispersal of mountain pine beetle, the vulnerable stands of lodgepole pine are located in Taylor Park at the headwaters of the Taylor River, the Fossil Ridge Wilderness, and the headwaters of the Quartz Creek Drainage. For the majority of these vulnerable stands their susceptibility to mountain pine beetle is high, as much of the stand structure is composed of large diameter, older-aged trees growing in high density.

While at an endemic state, bark-beetle activity plays an important ecological function; however, epidemic outbreaks can lead to catastrophic landscape-scale disturbance. When epidemics start covering larger landscapes, it is not possible to effectively stop them. Though the mountain pine beetle is at epidemic levels, last year's 600 acres only amounted to 0.2% of the lodgepole acres in the Gunnison Basin. It is early in the epidemic and acting as quickly as possible is our best chance at managing and reducing the beetle population. A neighboring, landscape-scale planning effort, the Taylor Park Vegetation Management project, is an adaptive project developed to be responsive to situations like the Wilder-Highlands outbreak.

Project Description

Proposed treatments are on lands within the Wildland-Urban Interface (WUI) and have stands that contain or are susceptible to mountain pine beetles. Proposed silvicultural prescriptions include direct sanitation, salvage, and long-term preventative forest management practices that reduce stand susceptibility to mountain pine beetle. All lands proposed for treatment are outside of wilderness areas, wilderness study areas, and Colorado Roadless Areas.

Proposed treatments would occur on approximately 2,064 acres of NFS lands managed by the Gunnison Ranger District as well as potentially on 1,005 acres of potential treatment in the adjacent communities of Gunnison Highlands and the Wilder on the Taylor in a holistic, all-lands effort to manage against a mountain pine beetle outbreak across jurisdictional boundaries. Total amount of treated acres would be limited to 3,000 under this decision. Proposed treatment would be conducted in Sections 32-33, T15S, R 84W, Sixth PM; Sections 7-8 & 16-21, T51N, R2E and Sections 12-13 & 24, T51N, R1E, New Mexico PM, Gunnison County, Colorado.

Treatment areas are identified in the enclosed map; however, specific treatment prescriptions or combinations of prescriptions (see below) would be determined during implementation based on current beetle infestation status and other on the ground conditions (e.g., proximity to private lands).

Proposed treatments would be accessed via Forest Service Road 742 and 743. Access into proposed treatment areas would utilize private roads maintained by the communities adjacent to the proposed treatment area. Less than 15 miles of temporary roads, not on the Motor Vehicle Use Map, would be used to access proposed treatment areas. Some temporary roads would be accessed via private property.

Temporary roads utilized for the proposed treatments would not be open to the public for motorized or mechanized use and all would be decommissioned within 3 years of project completion.

Proposed treatments could utilize tracked and/or rubber-tired forestry equipment including (but not limited to) feller buncher, skidder, tethered or cabled systems, forestry mulcher and/or chipper. Proposed treatment may also utilize hand crews/saw crews, a curtain burner, and/or a helicopter.

Operational Period

Implementation of treatments is anticipated to occur over the next five years, prioritizing beetle sanitation treatments. Operational periods would occur between May 15th and December 1st, annually.

Beetle Monitoring and Project Adaptability

- Beetle population monitoring to be completed using lure-baited lindgren funnel traps to establish a better understanding of mountain pine beetle flight times in the area. Traps would be placed late June and checked every week to establish flight times. This would be repeated until beetles are no longer being trapped. Forest Health would do this for a minimum of three years.
- Additional beetle monitoring would consist of brood sampling from currently infested trees to project if populations are stagnant, increasing, or decreasing.
- Continued ground monitoring through use of transects to identify red/green ratios (new dead and newly infested). This also helps determine if it's spreading.
- Continued aerial detection survey to identify newly infested trees and provide maps with infested polygons. Aerial survey is used to detect infested areas that you normally would not notice from the ground.
- Based on field observations and beetle monitoring, polygon treatment timing and prescriptions would be adjusted to match current conditions throughout the implementation period.

Treatment Prescriptions

Direct Sanitation Prescription

Proposed sanitation operations will remove and treat trees currently infested with mountain pine beetle. Treatment options may include hand felling, tracked or rubber-tired equipment, and or helicopter logging. Stumps of infested trees will be cut as close to the ground as feasible and no higher than 4" off the ground on the uphill side. Additional requirements will be necessary for treatment of material greater than 4" diameter that is infested with mountain pine beetles. Additional requirements of infested material may include:

- Burning to full consumption/entirety of logs scorched;
- Peeling bark mechanically or by hand to expose larvae to elements;
- Chipping/masticating to a material size of no greater than 2"x2";
- Heat treating by wrapping in a minimum of 6 mil plastic for a minimum of 8 weeks in an open sunny exposure; or

- Infested material will be hauled off site away from available lodgepole pine, ponderosa pine, and or limber pine host trees in order to avoid the spread of beetles.

As work will be conducted in the WUI, contractual work will also include management of material less than 4" diameter. This material can be chipped, masticated, and/or piled.

Salvage Prescription

The proposed treatment prescription would remove standing dead beetle-killed lodgepole pine to reduce hazardous fuel load and promote regeneration. Salvage operations will be carefully planned and administered to protect other resource values, including but not limited to, the maintenance of snag structure for wildlife habitat.

Long-term Preventative Prescriptions

Clearcutting proposed would occur in areas of lodgepole pine stands with a high susceptibility index due to age class and density.

- This potential prescription would involve removal of all lodgepole pine greater than 4" DBH.
- Slash resulting from treatment would be lopped and scattered to lay within two feet of the ground, unless fuel loading issues in the wildland urban interface require mastication and/or pile burning.

Overstory removal would occur in lodgepole pine stands with a high infestation susceptibility index due to over-mature age classes. The proposed treatment prescription would remove dominant trees greater than 8" DBH vulnerable to infestation from mountain pine beetle. Younger trees in the understory would be expected to release (or grow more quickly) upon removal of the overstory.

- Tree species other than lodgepole pine would be retained, unless their removal was necessary.
- Slash resulting from this treatment would be lopped and scattered to lay within two feet of the ground, unless fuel loading issues in the wildland urban interface requires mastication and/or pile burning.

Commercial thinning would occur in stands dominated by dense, immature lodgepole pine poletimber with crowns self-pruning and crown bases elevated. Trees within these stands are of a size suitable for posts, poles, and small-diameter sawlogs. The intent of this treatment will be to reduce stand density and improve tree health and vigor by reducing competition. Additionally, commercial thinning would open stands up, break-up canopy continuity, and reduce fuel loading.

- This is to be accomplished by thinning the stand from below, while retaining the taller, healthier lodgepole pine as well as healthy non-host species which may occur on-site.
- Thin to four to twelve-feet crown spacing, or 80 to 120 square feet basal area. Residual spacing maybe uniform, irregular to clumpy. Larger open areas may be created to better reduce canopy continuity, balanced with nearby denser areas.
- Target for removal any dwarf mistletoe trees, insect-infested trees, trees of poor form, forked, poor health or vigor, overtopped and suppressed trees.
- If clumps of young, healthy seedlings and saplings are found in areas of open canopy, the clump maybe retained to provide vertical diversity, wildlife cover, visual screening, and a young tree component.

Pre-commercial thinning would occur in dense stands of small diameter lodgepole pine stands. The intent of this potential treatment to encourage desirable growth rates and promotion of tree vigor and reduced competition between trees.

- Generally, these stands would be thinned from below leaving the more dominant, healthy trees at a spacing of 8 to 12 feet between stems, depending on the size of the trees.
- Residual tree spacing is guided by “crown spacing” of two to six feet between trees.
- Leave tree arrangement may be uniform in some areas and more irregular in others. Open areas are counterbalanced by denser areas.
- Where hand piling of slash and burning is indicated, slash openings up to 50-feet across would be created to accommodate the burning.
- Tree species other than lodgepole pine would be retained unless their removal is necessary for safety or operational purposes.
- In the WUI where windthrow risk is judged to be low or moderate, residual tree spacing maybe increased and/or more open areas installed with the goal of reducing crown continuity.

Private Lands Treatments

Adjacent private lands are included for consideration, since this project is looking at treating both federal and private lands. Under the Wyden Amendment (Public Law 109-54, Section 434), federal funding can be used for treatments on private lands. Wyden authorizes the Forest Service to enter into cooperative agreements with willing private landowners for the protection, restoration and enhancement of fish and wildlife habitat and reduction of risk from natural disasters, including insects.

Project Design Features

The following design features would be included to provide for consistency with the Forest Plan and other guidance, and or they would minimize potential impacts to the applicable resources. During implementation, if changes are needed to optimize treatment effectiveness, the implementation project lead (Foresters/Contract Administrators) will work with the corresponding specialist to come up with a solution to maintain the intend of the design feature.

Beetle Measure

- Sanitation is the first priority and should be executed before beetle flight in July. However, sanitation, thinning, salvage, and susceptible stand treatment could continue through beetle flight. After flight, additional recon and tree marking should be done to identify new trees that beetles attacked during flight. These trees can then be removed with the original prescription.
- Beetle infested logs/wood should be removed from the site and at least 3 miles away from susceptible hosts.
- If infested logs cannot be removed from site, mastication is recommended.

Fire/Fuels

- Treatment units that directly boarder private lands would have slash piled and burned within 1000 feet of the private lands boundary or as determined by the Silviculture and Fuels specialist to create a fuel break.
- Treatment areas outside of 1000 feet from private lands would follow forest plan standards for slash as identified in the GMUG land and resource management plan—10 to 20 tons of woody debris per acre.
- Slash Piles
 - Mechanized or machine slash piles would not be less than 12 feet in height. Piles shall not be constructed as windrows, rather the size of each pile’s footprint shall be minimized. The size of each pile’s footprint shall not exceed 50 feet in any dimension.
 - Hand piles would resemble a round mound approximately 13’ long x 13’ wide x 7’ high to facilitate burning.

- Piles would be constructed in a manner that excludes dirt/other non-burnable material. This reduced fuel loading would directly influence fire behavior, initiation of crown fire, fire line intensities and flame lengths that dictate strategy and tactics of wildfire operations. When complete, this project would help to create defensible space adjacent to private property and would help increase safety margins for firefighters while engaged in desired and undesired wildfire events.

Water Quality/Soil Productivity

- All operations will conform to the direction provided in Chapter 10 of the Water Conservation Practices Handbook (WCPH), FSH 2509.25 Chapter 10. The various measures may be achieved through avoidance, on-the-ground marking, appropriate contract provisions, identification on the sale area map, or during sale administration.
- Limit ground skidding to slopes of 40% or less to reduce potential soil erosion.
- Operate heavy equipment for land treatments only when soil moisture is below the plastic limit (*a rolled thread of soil 1/8" in diameter crumbles or cracks when the soil moisture content is below the plastic limit*), or protected by at least 1 foot of packed snow or 2 inches of frozen soil.
- Minimize the use of post-harvest slash piling and site preparation in order to maintain 10-15 tons per acre of coarse woody debris within harvest units (outside of fuel break area) and to protect nutrient rich litter layers and surface A horizons. Limbs and tops (fine fuels) should be lopped and scattered to retain nutrients concentrated in crown materials on site.
- Reclaim roads, landings and other disturbed sites when project-related use ends, as needed, to prevent resource damage.
- Remove road ditches & ditch relief culverts, site-prepare, drain (install water bars, out- slope, or re-contour), de-compact (rip to a depth of 6 to 8 inches, and do not rip if surface rock fragments are greater than 40%), re-vegetate by seeding and mulching with weed free straw or logging slash, and close system roads to be decommissioned, temporary, and intermittent use roads and other disturbed sites within one year after use ends.
- The minimum horizontal width of the Water Influence Zone for various water related features is as follows:

Feature	Outside Edge of WIZ	No Harvest or Mechanical Travel Zone
Fens and wetlands	100 ft minimum from edge of fen	100 ft from edge of fen
Perennial Streams	100 ft. from stream bank	50 ft from stream bank
Intermittent Streams, Reservoirs and Ponds	50 ft. from bank or high water line	25 ft from bank or high water line
Springs and Seeps	50 ft. from the source or edge of associated wetland, whichever is greater	25 ft from the source of edge of associated wetland, whichever is greater
Ephemeral Streams and Swales	25 ft from the channel or topographic low	
Ditch	Edge of Right of Way	

- Keep heavy equipment out of streams, swales and lakes, except to cross at designated points, build crossings, or do restoration work or if protected by at least 1 foot of packed snow or 2 inches of frozen soil. Keep heavy equipment out of streams during fish spawning, incubation,

and emergence periods. Do not excavate earth material from, or store excavated earth material in, any stream, swale, lake, wetland, or WIZ.

- Limit roads and other disturbed sites to the minimum feasible number, width, and total length.
- Design all roads, trails, and other soil disturbances to the minimum standard for their use and to "roll" with the terrain as feasible *in order to limit the use of cuts and fills*.
- Use filter strips, and sediment traps if needed, to keep all sand-sized sediment on the land and disconnect disturbed soil from streams, lakes, and wetlands. Disperse runoff into filter strips.
- Skid trail locations will be agreed to by the Forest Service in advance of construction, and will be located to minimize impacts to advanced regeneration; spacing will be approximately 100 feet apart, allowing for topographic variation and skid trail convergence. Skid trails will be waterbarred at least every 100 feet on slopes greater than 20% or as needed depending on slope and ground conditions and slash placed on main trails as needed to control erosion.
- Space water bars and rolling dips according to road grade and soil type as indicated below:

Unified Soil Classification - ASTM D 24871				
Slope (%)	ML, SM Extr. Erodible Silt-sands with little or no binder (d.g.)	MH, SC, CL Highly Erodible Silt-sands with moderate binder	SW, SP, GM, GC Mod. Erodible Gravels + fines & sands with little or no fines	GW, GP Low Erodible Gravels with little or no fines
1-3	200	300	400	500
4-6	125	200	300	400
7-9	100	150	200	250
10-12	70	100	150	200
13-25	50	50	75	100
25+	30-50	30-50	60-75	80-100

1 American Society for Testing Materials, standard classification of soil for engineering purposes.

- Place new sources of chemical and pathogenic pollutants where such pollutants will not reach surface or ground water.
- Ensure that all designed road drainage features are fully functional and effective throughout the operational periods.

Range and Invasive Weeds

- All rangeland improvements will be identified in the timber sale or service contract as protected features.
- Timber sale contract provision for the control of noxious weed proliferation will be included in the timber sale contract where needed.
- Mobilizing equipment: Clean all heavy equipment and mobilizing equipment before entering Gunnison County, or before arriving to County Road 743 prior to entering the project area to prevent possible introduction on invasive species in Gunnison sage-grouse habitat. Power washing is the most effective method of cleaning.
- Equipment shall be considered free of soil, seeds, vegetation, and other such debris when a visual inspection by operator or staff does not find such material on the undercarriage, cross members, frame, skid plates, belly pans, wheels, treads, tracks, suspension, bumpers, wheel wells, radiator grills, and the ledges on the inside of rear and front bumpers.
- Once working within the project area, if equipment operated at a site infested with invasive plants, the equipment should be cleaned before traveling between sites, especially when operating within the Gunnison sage-grouse designated critical habitat boundary. Hand washing, particularly

power washing is the most effective cleaning method but not always practical in the field. Mechanical removal of mud, plants, or other foreign materials via “brooming” may be appropriate in the field.

- Control noxious weed populations within treatment areas, during and after vegetation treatment. Weed treatment will emphasize infestations on existing landings, skid trails, and haul roads, and will occur over multiple years – as needed.
- If heavily infested areas are known along haul routes and along planned temporary road locations, work with the range staff and Gunnison County Weed Coordinator to identify sections where it may be appropriate to treat or consider in terms of temporary road layout to avoid infestations.
- Minimize operations of equipment during conditions when mud can accumulate on equipment. Generally, these types of conditions exist when damage to the road surface can occur.
- When scheduling allows, schedule temporary road development, road improvements and maintenance when seeds or propagules are least likely to be viable and to be spread. Generally, the ideal timing is in the spring before grasses develop seed heads or late in the season after grasses become dormant. The ability to integrate this design feature is limited due to the March 15 – May 15 Gunnison sage-grouse timing restriction. In consultation with range staff, if no weeds, especially cheatgrass, are found where temporary roads or road improvements are located, then no scheduling adjustments for road work would be necessary.
- Retain native vegetation to the extent possible to prevent weed germination and establishment, in and around sale area activity and keep soil disturbance to a minimum.
- Timber purchasers and contractors will re-seed disturbed areas (as designated by the Forest Service) with certified weed free source using San Luis slender wheatgrass or another acceptable seed mix (as determined by agency officials) to avoid introduction of exotics and promote re-vegetation of native species. Species of seed and mixtures ratios for re-seeding activities will be determined on a site-specific basis.

Wildlife

- Maintain 10 - 15 tons per acre of downed wood (woody material >3” diameter) within harvest units outside of the fuel break areas.
- Maintain large diameter downed logs in various stages of decomposition within harvest units (50 linear feet/acre of 10 inches diameter or larger at the large end of lodgepole pine and aspen logs) outside of fuel break areas.
- For lodgepole pine stands, maintain a minimum of 300 snags per 100 acres, with a minimum DBH of 10”, where physically and biologically capable outside of fuel break areas. Snags do not need to be retained on every acre.
- Northern goshawk - no activities will be allowed within ½ mile of active nests from March 1 to July 31 or until fledging has occurred. The timing restriction buffer could be reduced to ¼ mile if topographic features and/or adequate screening cover are present that would protect the nest site from disturbance. No harvest activities will be allowed within a 30-acre buffer of nest sites. Outside of a 30-acre area around goshawk nest sites, timing restrictions are not needed for project layout, marking, and any other activities that are non-disturbing (i.e., activities not involving the use of heavy equipment or chainsaws). Timing restrictions will only apply to active nests, as confirmed by the district wildlife biologist.
- On-going surveys for raptors would be conducted to determine locations of individuals or populations of these species and allow for the implementation of protection measures as appropriate.
- Place landings in areas without advanced tree regeneration if available, to protect understory. Areas supporting live advanced regeneration will be avoided during unit layout.
- Roads to access portions of the project area occur in Gunnison Sage-Grouse designated critical habitat. Access routes in designated critical habitat will not be used from March 15 – May 15.

- The operational period does not overlap winter months, but does include flexibility to adjust future treatment periods according to monitoring data. If the operational period is adjusted, do not operate from December 1 to April 15 to avoid disturbing deer and elk on winter range.
- Elk Calving Areas:
 - Provide hiding cover within 1,000 feet of any known elk calving areas. The District wildlife biologist will be responsible for coordinating with Colorado Parks and Wildlife to identify calving areas and informing timber and fire staff on locations. When calving areas are identified, a 1,000-foot buffer will be applied and existing vegetation conditions within the buffer will be assessed by the District biologist to determine cover needs, identify areas to avoid with treatments, or coordinate with timber and fire staff to determine how treatments could be designed to maintain or enhance cover.
 - To minimize disturbance to elk during the calving season, apply a seasonal timing restriction to treatment activities in areas identified by Colorado Parks and Wildlife (CPW) as elk production areas, as supported by best available scientific information (CPW Species Activity Mapping or GPS radio telemetry monitoring).
 - From May 15 to June 30, do not implement treatment activities in harvest units identified to occur within the mapped elk production area. This applies to treatment units in the vicinity of roads 743, 586 and 586.2A, but this timing restriction does not apply to use of the roads.
- Lynx - Coincidentally, the mapped elk production area includes most of the lynx habitat in the project area. This timing restriction also overlaps the denning time period for lynx. If a female lynx chooses to den and raise kittens there, the elk calving timing restriction will prevent disturbance to lynx during this critical period.

Forest Service sensitive Plants

- If a sensitive species (e.g., *Machaeranthera coloradoensis* or *Botrychium paradoxum*) is found, the area will be flagged and avoided.

Transportation System

- New temporary roads, or other non-system roads, built and/or used during logging and post-logging activities will remain closed to the general public and will be effectively closed and decommissioned to all motorized use within 3 years after harvesting activities are completed. To ensure public use does not occur at any time throughout implementation, temporary roads will be signed closed to public use or, if necessary, barricaded/gated.
- Surface rock replacement deposits will be collected to maintain currently surfaced roads that are used for timber hauling. Road maintenance deposits will be collected on any system road used for timber hauling. Deposits will be collected commensurate with the use.
- Timber hauling operations will be restricted during wet or thawed conditions, when needed to protect the road surface.
- Safety signing will be used to alert the public that logging operations are in progress and would meet the requirements of the Manual of Uniform Traffic Control Devices (MUTCD).

Silviculture

- All regeneration cutting will meet stocking standards as defined in the Forest Plan in accordance with NFMA.
- All vegetation treatments will be prescribed by a U.S. Forest Service, Region 2, Certified Silviculturist.
- During site preparation or piling activities, mineral soil exposure will be less than 40% of the treated area.

Air Quality

- Slash disposal to be accomplished by burning piles would be conducted in a manner, which complies with the State of Colorado air quality guidelines.

Cultural Resources

- Cultural resource surveys will occur prior project implementation. Locations of all known cultural resource sites needing protection would be shown on internal working maps not subject to disclosure and/or identified on the ground so that these areas are avoided and protected during all phases of project implementation.
- If any new cultural resource sites are discovered during implementation, project activities would stop and the agency archeologist would be contacted immediately. The operator shall take any additional measures requested by the USFS to protect discoveries until they can be adequately evaluated by the permitted archaeologist. Within 48 hours of the discovery, the SHPO and consulting parties will be notified of the discovery and consultation will begin to determine an appropriate mitigation measure. Agency officials in cooperation with the operator will ensure that the discovery is protected from further disturbance until mitigation is completed. Operations may resume at the discovery site upon receipt of written instructions and authorization by agency officials.
- On National Forest Lands, activities involving mechanical treatment, skid trails and landing areas: For all cultural resource sites located during the field inventory or previously known, no mechanical treatment will occur within the site boundary plus a 50 foot buffer around the site. If treatment is necessary, these sites and the 50 foot buffer will be hand treated to remove hazard trees and accumulated fuel build up.
- Activities involving road construction, temporary road construction and skid trails: For all cultural resource sites located during the field inventory or previously known, a 50 foot buffer around the site will be established. The road control line will be moved to avoid the site and the 50 foot buffer area. If the construction cannot physically be relocated and there is the potential for unidentified buried cultural remains, the construction activities in the area will be monitored by an archaeologist.
- Native American human remains: Pursuant to 43 CFR 10.4(g), the holder must notify the authorized officer, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony on federal land. Further, pursuant to 43 CFR 10.4 (c) and (d), the holder must stop activities in the vicinity of the discovery that could adversely affect the discovery. The holder shall make a reasonable effort to protect the human remains, funerary items, sacred objects, or objects of cultural patrimony for a period of thirty days after written notice is provided to the authorized officer, or until the authorized officer has issued a written notice to proceed, whichever occurs first.

Monitoring

Monitoring occurs at two levels: the programmatic or Forest Plan level and the project specific level. Following are several monitoring activities relevant to this project.

Project Implementation

- General implementation of the project (sale and road design, contract preparation, contract administration, and implementation of design features) will be completed by qualified Forest Service personnel and reviewed by the District Ranger and staff on an as needed basis. Contract administration will be conducted on a regular basis and as needed to obtain acceptable contract performance. The District Ranger will review and approve project development after completion of each major step according to Forest Service procedures and guidelines.

Noxious Weeds

- Disturbed areas, such as roads, landings, and skid trails, will be monitored for noxious weeds. Chemical, biological, cultural, and mechanical techniques would be used as appropriate to control populations of noxious weeds as described in the 1995 EA for the Gunnison District
- Weed Management Program. All treatments of noxious weeds would follow state and federal regulations.

Reforestation

- Regeneration surveys would be conducted on harvested sites during the first, third, and fifth years after treatment. Should this monitoring conclude that additional cultural treatments are required, such treatments would be applied.

Soils and Water

- Monitoring soil moisture conditions during harvest activities to assure that heavy equipment use is only occurring during periods of time when the soil is dry enough to support this use without excessive impact. Monitoring will be performed by the Timber Sale Administrator in coordination with the Forest Soil Scientist.

Wildlife

- Species-specific monitoring will continue in the project area to validate the effectiveness of design features and to determine if species responses to the proposed project were those expected.

Temporary Roads

- All newly constructed roads in the treatment area will be decommissioned within 3 years of completion of treatments. Monitoring will continue to ensure this have been completed and report in the appropriate database of record

Action Area for Effects Analysis

The action area includes “all areas to be affected directly or indirectly by the Federal Action and not merely the immediate area involved in the action” (USFWS 1998; 50 CFR § 402.02). For the Gunnison sage-grouse, this includes all associated activities that will occur, including truck traffic on roads going through Critical sage-grouse Habitat (CH) that could impact habitat and nesting and brood-rearing behavior during the breeding season (March 15-July 15). For lynx, the action area is the Lynx Analysis Unit/s affected by the proposed action.

Gunnison sage-grouse (GuSG)

The action area for the GuSG includes the extent of designated critical habitat overlapping the project activities combined with a 0.50- mile radius from temporary road construction and use and haul roads used by log trucks through critical habitat; and a 1-mile distance into designated critical habitat from treatment units. This is based on a noise assessment, which identified the distance that point source noise attenuates back to background noise (**Appendix A**). The extent of the action area is based on the proposed action tasks that may cause effects to habitat and birds. These were:

- Treatment units within designated critical habitat or close enough to designated critical habitat to cause noise disturbance;
- The use of open public roads as haul routes for transporting harvested timber (Road 743), causing increased noise; and

- The construction, use and post-treatment closures of temporary roads.

Canada Lynx

The action area for the Canada Lynx is the Fossil Ridge Lynx Analysis Unit (LAU).

Analysis Method

A review of federally threatened, endangered, and proposed species that may occur or be affected by the proposed action was conducted. Available information was assembled on occurrence records, species life history and habitat requirements to inform this analysis. Sources of information included Forest Service records and spatial data (Natural Resource Manager- USFS corporate wildlife database, Vegetation Polygon Data -FS Veg, GMUG National Forests lynx habitat mapping), the Colorado Natural Heritage Program database (CNHP 2020), other federal and state wildlife agency information (USGS Fort Collins Science Center, Colorado Parks and Wildlife), and published scientific literature cited in this document. A site-specific query of the USFWS IPaC database was also conducted (USFWS 2020- **Appendix B**).

Threatened, Endangered, and Proposed Species Considered

The following list includes threatened, endangered, and proposed species, and/or designated critical habitat that are located within, adjacent to, or downstream of the project area and could potentially be affected by project activities. According to the USFWS Information, Planning and Conservation (IPAC) system (accessed for this BA on March 23, 2020 – USFWS 2020) there are 8 federally listed threatened, endangered, and proposed species and designated critical habitat for one species that could potentially be affected by the project.

No further analysis is needed for species that are not known or suspected to occur in the project area, and for which no suitable habitat is present. Of these 8 federally listed species, there are 5 that do not have suitable habitat within the project area, are not known or expected to occur within the project area, or the project is outside the elevational range of the species and would not be affected by project activities. The bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*) and razorback sucker (*Xyrauchen texanus*) do not have suitable habitat within the project area, their range is outside the project area and downstream habitats would not be impacted by project activities. It has been determined that the proposed project activities would have “**No Effect**” on these species and are briefly described in the table below.

Table 1. Federal Threatened, Endangered or Proposed Species considered (USFWS 2020 – **Appendix B**; USDA Forest Service 2020)

Common Name/ Scientific Name	Habitat Type	Status	Known or suspected to be present?	Suitable habitat present?	Designated Critical Habitat present or could be affected?	Effect	Rationale
Birds							
Gunnison sage-grouse <i>Centrocercus minimus</i>	Sagebrush ecosystem	Threatened	Possible	Yes	Yes	NLAA	<p>The project activities have the potential to create noise disturbance to individual birds, potentially disrupting nesting, foraging, and brood-rearing behavior, potentially increasing susceptibility to predation, and potentially displacing birds.</p> <p>Pre-field review verified there is no suitable habitat or designated critical habitat PCEs within the treatment units. Portions of haul routes and temporary roads are in occupied designated critical habitat. Where treatment units and temporary roads occur in designated critical habitat, they are on or near the periphery of the critical habitat designation within the forest-sagebrush interface.</p>
Critical Habitat						NLAA	<p>The majority of the project area is predominately lodgepole pine, with lesser amounts of aspen, Douglas fir, and Engelmann spruce forest stands. None of the critical habitat primary constituent elements, as defined by the USFWS critical habitat designation final rule are present in treatment units (https://www.fws.gov/mountain-prairie/species/birds/gunnisonsagegrouse/GuSGCriticalHabitat_11202014.pdf). The action area is defined as a 0.5 mile buffer of temporary roads and haul routes in designated critical habitat, and includes all designated critical habitat within a 1 mile buffer of treatment units. The action area does contain designated critical habitat PCEs (PCE 2 - breeding habitat and PCE 3 – summer-late fall habitat). There are an estimated 4.5 miles of temporary roads within the non-forested portions of the designated critical habitat that may cause temporary habitat effects</p>

Common Name/ Scientific Name	Habitat Type	Status	Known or suspected to be present?	Suitable habitat present?	Designated Critical Habitat present or could be affected?	Effect	Rationale
							(reduction in sagebrush, grass and forb cover within the temporary road footprint) or a potential for effects (nonnative, invasive plants). Of those 4.5 miles (4.5 mi x 16-foot road width = 8.7 acres), 422 feet (6,752 square feet = 0.16 ac) of temporary roads occur in modeled habitat with a high relative probability of nest occurrence (USGS, Fort Collins Science Center 2011; Aldridge et al. 2011).
Fish							
Bonytail chub <i>Gila elegans</i>	Colorado River system.	Endangered	No	No	No	NE	Pre-field review verified there is no suitable aquatic habitat. Project activities will not have any effect on aquatic habitat. There will be No Effect to the Colorado River drainage and no water depletions would occur.
Colorado pikeminnow <i>Ptychocheilus lucius</i>	Colorado River system.	Endangered	No	No	No	NE	Pre-field review verified there is no suitable aquatic habitat. Project activities will not have any effect on aquatic habitat. There will be No Effect to the Colorado River drainage and no water depletions would occur.
Humpback chub <i>Gila cypha</i>	Colorado River system.	Endangered	No	No	No	NE	Pre-field review verified there is no suitable aquatic habitat. Project activities will not have any effect on aquatic habitat. There will be No Effect to the Colorado River drainage and no water depletions would occur.
Razorback sucker <i>Xyrauchen texanus</i>	Colorado River system.	Endangered	No	No	No	NE	Pre-field review verified there is no suitable aquatic habitat. Project activities will not have any effect on aquatic habitat. There will be No Effect to the Colorado River drainage and no water depletions would occur.
Greenback cutthroat trout <i>Oncorhynchus clarki stomias</i>	Mid- to high-elevation cold-water streams and rivers.	Threatened	No	No	No	NE	Pre-field review verified there is no suitable aquatic habitat. Project activities will not have any effect on aquatic habitat. No water depletions would occur.
Mammals							

Common Name/ Scientific Name	Habitat Type	Status	Known or suspected to be present?	Suitable habitat present?	Designated Critical Habitat present or could be affected?	Effect	Rationale
Canada Lynx <i>Lynx canadensis</i>	Engelmann spruce-subalpine fir is the dominant cover type used year-round, followed by a mix of Engelmann spruce, subalpine fir and aspen as the second most common cover type and various riparian (willow) and riparian-mix areas as the third most common cover type used (Shenk 2009). Critical habitat has not been designated in the	Threatened	No	Yes	No	NLAA	<p>Lynx are not anticipated to use habitat in the project area (area of treatment activities) or the action area (Fossil Ridge LAU) on a regular basis based on data from Colorado Parks and Wildlife (Theobald and Shenk 2011). Lynx habitat affected by the project does not contain denning habitat characteristics (large, coarse woody debris) and is unlikely to be used during the denning period. While the potential exists for lynx to move through the area, lynx are more likely to use larger blocks of contiguous habitat that provide greater snowshoe hare prey abundance elsewhere.</p> <p>The project is consistent with the Southern Rockies Lynx Amendment management direction.</p>

Common Name/ Scientific Name	Habitat Type	Status	Known or suspected to be present?	Suitable habitat present?	Designated Critical Habitat present or could be affected?	Effect	Rationale
	Southern Rockies.						
North American Wolverine <i>Gulo Gulo Luscus</i>	Typically remote, forested areas and tundra with little to no human disturbance, particularly areas with persistent snow cover into late spring or early summer which is required for den sites.	Proposed	No	Yes	No	<i>will not jeopardize</i>	<p>Potential habitat in Colorado is presently considered unoccupied. Although occasional sightings of wolverine occur and are reported on the Forest, there had been no confirmed occurrences locally or in Colorado since 1919, until the arrival of M56 (radio-collared male wolverine that traveled into Colorado from Wyoming in 2009 but did not travel onto the GMUG National Forests, now deceased) and a road kill wolverine documented by CDOT on Hwy 70 in 2012.</p> <p>On February 4, 2013, the USFWS published a proposed rule to list the distinct population segment (DPS) of the North American wolverine as threatened under the ESA (78 FR 7864). On August 13, 2014, the USFWS withdrew their proposed rule to list as threatened (79 FR 47522). On April 4, 2016, the District Court for the District of Montana vacated USFWS's August 13, 2014, withdrawal of their proposed rule to list the DPS of the North American wolverine as threatened under the Act, which effectively returned the process to the stage of the February 4, 2013 proposed listing rule (78 FR 7864). As such, the U.S. Fish and Wildlife Service has reinstated the Proposed for ESA protection status for wolverine.</p> <p>Given that all potential habitat associated with the proposed action is currently unoccupied, there will be no effect on the species. However, even if the species is eventually reintroduced to or recolonizes Colorado, activities such as vegetation management in response to Mountain Pine Beetles are not expected to have</p>

Common Name/ Scientific Name	Habitat Type	Status	Known or suspected to be present?	Suitable habitat present?	Designated Critical Habitat present or could be affected?	Effect	Rationale
							<p>measureable influences on wolverines and are not identified as a potential threat to the species.</p> <p>Based on this rationale, I determine that the proposed management activities associated with this analysis “<i>will not jeopardize</i>” the wolverine or influence any future options for achieving a self-sustaining population in the Southern Rocky Mountains.</p>

No Effect – (NE); May Affect, but Not Likely to Adversely Affect – (NLAA)

Consultation History

No previous consultation has been conducted for this project. This project represents a tiered consultation from that conducted under the Southern Rockies Lynx Amendment (SRLA) decision and tiers to the SRLA biological opinion (<http://www.fs.fed.us/r2/projects/lynx/documents/index.shtml>), because the anticipated effects from the proposed action are consistent with those anticipated and analyzed in the programmatic biological opinion. The biological opinion discusses effects in a general way at a broad-scale, programmatic level. As such, site specific effects of the proposed action are discussed and analyzed below.

The Candidate Conservation Agreement for the Gunnison Basin Gunnison sage-grouse population was reviewed to identify applicable conservation measures that could be integrated into the project, discussed further below. On March 4, 2020, Allison Hearne with the USFWS Ecological Services office in Grand Junction, CO and Matt Vasquez, Gunnison Ranger District wildlife biologist, conducted a “deconstructing the action” exercise for this project as a means of exploring the project’s impact to the Gunnison sage-grouse and its habitat. This information was then used to assess the species exposure to habitat impacts, response to exposure, and the resulting biological effects, described in the Effects Analysis for Gunnison sage-grouse.

Environmental Baseline for Canada Lynx

Analysis Approach

Analysis of the Wilder-Highlands Mountain Pine Beetle Response project for Canada lynx and lynx habitat is based on the framework and incidental take statement established by the SRLA and supporting documents (USDA 2008) and the Biological Opinion (BO) issued by Fish and Wildlife Service (USDI 2008). Most of the impacts associated with the proposed project were addressed by these documents. This analysis builds on programmatic SRLA 2008 analysis by examining potential effects at the LAU scale. This analysis reviews the LAU and Forest scale caps under the SRLA Standards to ensure we stay within the original incidental take statement issued by U.S. Fish and Wildlife Service in 2008. Tracking and reporting to USFWS is completed annually to ensure cumulative impacts meet Forest Plan and BO requirements. Annual reporting occurs in February each year to USFWS.

Annual reporting includes:

1. Status of VEG S1 in affected LAU. A trigger of 25% has been established to ensure no more than 30% of lynx habitat in an LAU will be converted to unsuitable. This includes both management caused and from natural disturbances (e.g wildfire).
2. Status of VEG S2 in affected LAU. A trigger of 10% has been established to ensure no more than 15% of lynx habitat in the LAU will be converted to unsuitable as a result of management actions.
3. Status of VEG S5 Forest-wide. Currently the Forest has a cap of 42,293 acres of pre-commercial thinning. In addition, no more than 1 percent of lynx habitat in an affected LAU will also be pre-commercially thinned.
4. Status of VEG S6 Forest-wide. Currently the Forest has 7,071 acre cap of high quality habitat that could be affected due to incidental loss from salvage, within 200 feet of dwellings. Sites, etc, or to complete uneven-aged management in spruce-fir.

Fossil Ridge Lynx Analysis Unit (LAU)

This project occurs within the 55,126-acre Fossil Ridge LAU. There is no lynx linkage zone within this LAU. The Fossil Ridge LAU contains 25,718 acres of primary suitable lynx habitat, 10,853 acres of secondary suitable, and 18,555 acres of non-habitat.

Table 3. Environmental Baseline Statistics of Lynx Habitat.

Fossil Ridge LAU	Primary Suitable	Secondary Suitable	Primary Unsuitable	Total Lynx Habitat	Non-Habitat	Total LAU Acres
	Acres (Total Lynx Habitat)		Acres Unsuitable	Acres (Total LAU)		
	25,718	10,853	0	36,571	18,555	55,126

Based on FS Veg spatial data (GMUG_FSVegSpatial_JoinedData_03262016), the existing condition of spruce-fir and spruce-fir aspen cover types in the Fossil Ridge LAU is 0 percent early seral, 38 percent early-mid seral, and 62 percent mid-late seral. This is relevant because mosaics of habitat conditions are needed for habitat connectivity to support lynx movements. Habitat connectivity is defined as “cover vegetation” in sufficient quantity and arrangement to allow for the movement of lynx. Mosaics of habitat conditions include dense early seral coniferous and mixed-coniferous-deciduous stands and mature multi-storied stands. Connectivity at the LAU scale is best achieved by providing for a mosaic of habitat conditions across the landscape (USDA 2008 and Interagency Lynx Biology Team 2013). Consistent with approaches taken in several other landscape-scale vegetation management projects on the GMUG National Forests (SBEADMR Project [<https://www.fs.usda.gov/project/?project=42387>] and Taylor Park Vegetation Management Project [<https://www.fs.usda.gov/project/?project=53662>]), connectivity at the LAU scale is defined as movement toward Potential Natural Vegetation (PNV) as described in the comprehensive assessment for the Gunnison Basin Geographic Area (USDA 2005). The area where a given climax plant community can grow is classified as PNV type, and is named for the climax plant community. Table 4 identifies the PNV for the Fossil Ridge LAU based on VDDT¹ modeling for spruce-fir/spruce-fir aspen.

Table 4. Succession (Seral Stages) in Spruce-fir and Spruce-fir Aspen PNV Types for the Fossil Ridge LAU.

	Early Seral	Early-Mid Seral	Late-Mid-Seral	Late Seral
Desired Condition (%)				
VDDT Model Spruce- fir PNV	27-32%	20-24%	12-40%	
VDDT Model Spruce- fir- aspen PNV	13-19%	22-29%	13-49%	
Existing Vegetation Condition (%)				
Fossil Ridge	0	38	62	

Existing Condition was derived from FS Veg spatial data (GMUG_FSVegSpatial_JoinedData_03262016) using predominately the “Cover Type” field as described below:

- Spruce-fir = TSF (spruce-fir) cover type

¹ Vegetation Dynamic Development Tool (VDDT) is applied to Potential Vegetation Types (PVT), PVT is defined by a cover type and structural stage and succession does not take into account outside impacts; VDDT is used to introduce natural or man-caused disturbances (i.e. fire, vegetation treatments), to more accurately predict the future successional stage.

- *Spruce-fir-aspen = TAA (aspen) cover type. However for this Spruce-fir-aspen the data was further filtered by DLF_Species (dominate life form species) to only include aspen (PORT5) with some component of Engelmann spruce (PIEN) and/or subalpine fir (ABLA).*

The Wilder-Highlands Mountain Pine Beetle Response project will treat lodgepole pine using precommercial thinning, sanitation, and salvage vegetation management prescriptions. These treatments will occur in about 552 acres of lynx habitat containing 5 – 10 percent spruce-fir, as shown below in Table 5. This project has the potential to slightly shift habitat towards the desired condition for early seral and potentially increase the amount of spruce-fir present in the LAU by treating these stands with the potential to increase spruce-fir regeneration.

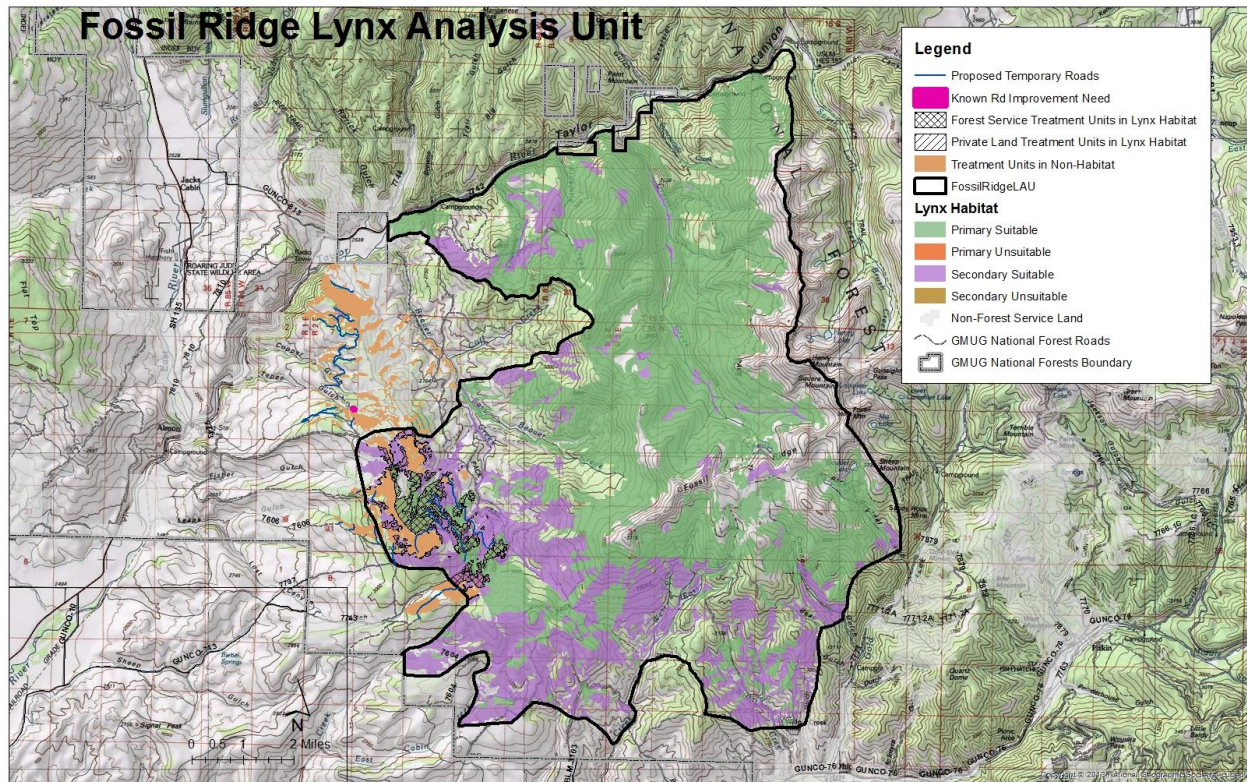


Figure 3. Fossil Ridge Lynx Analysis Unit Map

Approximately 906 acres of proposed treatment units occur within mapped lynx habitat (702 acres on Forest Service and 204 acres on private, which is 2.5% of the total lynx habitat in the action area). Lynx habitat is mapped as primary and secondary, based on the vegetation types and percent of spruce-fir in stands. Once mapped as lynx habitat, the primary and secondary distinctions have no influence on how lynx habitat management direction applies to the project. Conservation measures of the Lynx Conservation Assessment and Strategy (LCAS) and the SRLA apply to all lynx habitat. These definitions of lynx habitat are included here to provide more specific habitat data for the project area to better understand habitat components and habitat quality that may be influenced. Table 5 provides additional habitat details, which informed the lynx habitat effects analysis below. Treatment units with lynx habitat are dominated by lodgepole pine and aspen forest types, with lesser amounts of spruce-fir mixed in with both types, aspen mixed in with lodgepole pine types, and lodgepole pine mixed in with aspen types. There is a diversity of forest structure, with most of the stands being multistoried.

Table 5. Characteristics of lynx habitat within the project area treatment units.

Cover Type (Dominant Life Form)	Dominant Life Form %	% Lodgepole	% Spruce-fir	% Aspen	Forest canopy layers	Lynx Habitat	Acres
Treatment units on Forest Service lands							
Lodgepole	10	10	5	10	Single	Primary Suitable	8.37
Lodgepole	45	45	5	15	Multiple	Primary Suitable	24.79
Lodgepole	50	50	5	15	Multiple	Primary Suitable	18.96
Aspen	25	0	5	25	Multiple	Primary Suitable	0.79
Lodgepole	30	30	10	25	Multiple	Primary Suitable	40.62
Lodgepole	30	30	10	30	Multiple	Primary Suitable	127.88
Lodgepole	35	35	5	30	Multiple	Primary Suitable	76.79
Lodgepole	40	40	5	30	Multiple	Primary Suitable	79.76
Aspen	40	0	10	40	Multiple	Primary Suitable	5.74
Aspen	45	10	5	45	Multiple	Primary Suitable	29.49
Aspen	50	10	5	50	Multiple	Primary Suitable	13.65
Aspen	55	0	5	55	Multiple	Primary Suitable	18.05
Willow Riparian ¹	21	0	0	0	Multiple	Secondary Suitable	0.01
Willow Riparian ¹	35	0	0	0	Multiple	Secondary Suitable	0.01
Aspen	25	0	0	25	Single	Secondary Suitable	1.55
Aspen	30	5	0	30	Multiple	Secondary Suitable	7.64
Aspen	35	5	0	35	Multiple	Secondary Suitable	4.24
Aspen	40	30	0	40	Multiple	Secondary Suitable	39.63
Aspen	40	35	0	40	Multiple	Secondary Suitable	44.83
Aspen	40	0	0	40	Single	Secondary Suitable	0.26
Aspen	45	0	0	45	Multiple	Secondary Suitable	2.58
Aspen	45	20	0	45	Multiple	Secondary Suitable	3.47
Aspen	50	0	0	50	Multiple	Secondary Suitable	4.88
Aspen	50	10	0	50	Multiple	Secondary Suitable	15.26
Aspen	50	15	0	50	Multiple	Secondary Suitable	15.81
Aspen	55	5	0	55	Multiple	Secondary Suitable	4.23
Aspen	55	10	0	55	Multiple	Secondary Suitable	13.62
Aspen	60	10	0	60	Multiple	Secondary Suitable	22.77
Aspen	60	15	0	60	Multiple	Secondary Suitable	3.85
Aspen	60	10	0	60	Single	Secondary Suitable	10.32
Aspen	60	20	0	60	Single	Secondary Suitable	1.95
Aspen	65	10	0	65	Multiple	Secondary Suitable	26.71
Aspen	65	15	0	65	Multiple	Secondary Suitable	8.41
Aspen	70	5	0	70	Multiple	Secondary Suitable	2.20
Aspen	75	0	0	75	Single	Secondary Suitable	4.34
Aspen	75	5	0	75	Single	Secondary Suitable	18.46
Private Land Treatments							
Lodgepole	35	35	10	20	Multiple	Primary Suitable	32.61
Lodgepole	30	30	10	30	Multiple	Primary Suitable	73.89

Cover Type (Dominant Life Form)	Dominant Life Form %	% Lodgepole	% Spruce-fir	% Aspen	Forest canopy layers	Lynx Habitat	Acres
Aspen	40	0	0	40	Multiple	Secondary Suitable	0.31
Aspen	40	0	10	40	Multiple	Primary Suitable	0.32
Aspen	45	20	0	45	Multiple	Secondary Suitable	35.77
Aspen	50	20	0	50	Multiple	Secondary Suitable	11.18
Aspen	60	15	0	60	Multiple	Secondary Suitable	17.66
Aspen	65	5	0	65	Multiple	Secondary Suitable	17.89
Aspen	65	15	0	65	Multiple	Secondary Suitable	5.42
Aspen	70	5	0	70	Multiple	Secondary Suitable	1.76
Aspen	75	5	0	75	Multiple	Secondary Suitable	7.10

¹Willow riparian will not be disturbed by the project activities due to protective measures and project design features built into the project to avoid wetland and riparian areas. This is an artifact of GIS mapping.

Primary Suitable: Spruce-fir cover type, Seral lodgepole pine cover type w/≥5% spruce-fir, aspen w/≥5% spruce-fir

Secondary Suitable: Pure Aspen, Moist Douglas-fir (or other cool, moist conifer cover types such as blue spruce), riparian willow, and sagebrush. Secondary vegetation is buffered by 300 meters from primary. Secondary habitat farther than 300 meters from primary is not mapped as lynx habitat, derived from a "nearest Neighbor" distance analysis performed on snowshoe hare pellet data collected from Miller,2005 (SRLA Implementation Guide: Habitat Mapping).

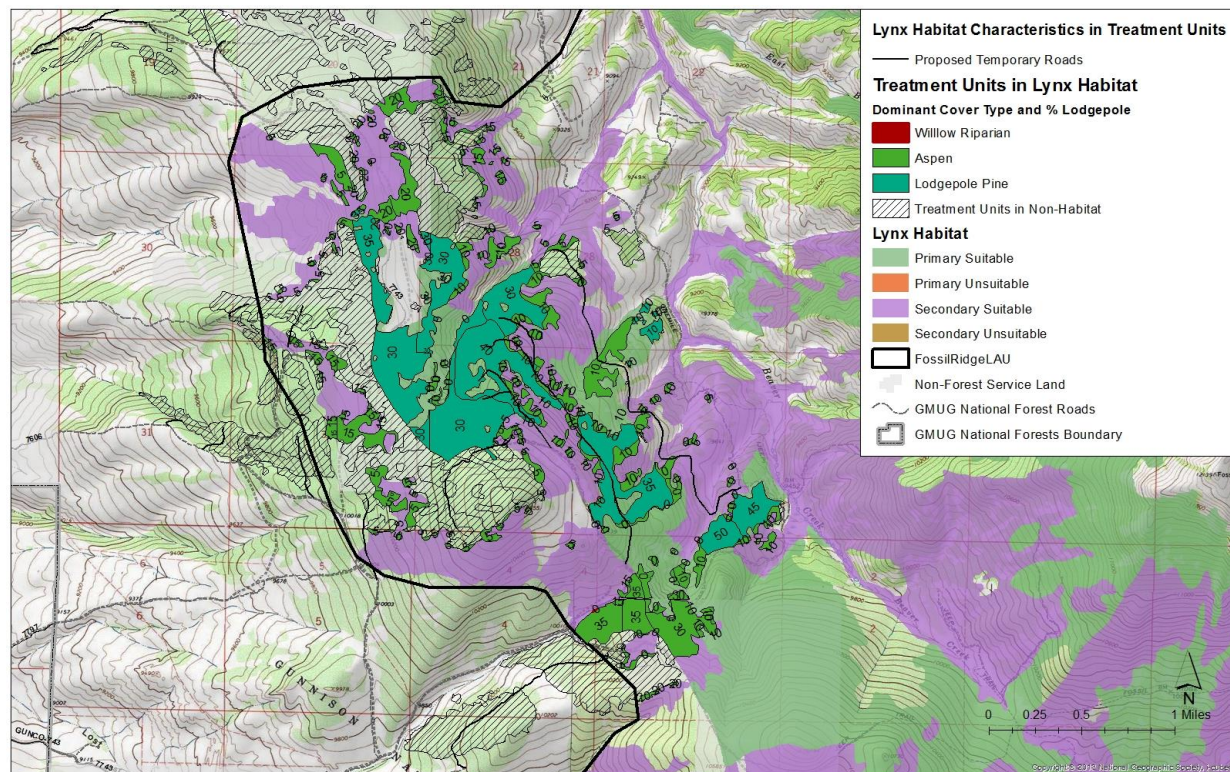


Figure 4. Dominant forest cover type of treatment units in lynx habitat, and percent lodgepole in stands. Most of the stands identified as lodgepole pine also have aspen mixed in. Both aspen and lodgepole pine dominated stands have lesser amounts of spruce-fir mixed in as well. The proposed treatments target mature lodgepole pine no smaller than 8" diameter.

Table 6 discloses baseline statistics for objectives, standards and guidelines from the SRLA. The SRLA established forest-wide caps and LAU caps that are tracked annually and reported to Fish and Wildlife Service. All caps are considered maximum acres of impact that can occur over the life of the Amendment.

Table 6. Lynx habitat management direction, standards and associated habitat impact caps under VEG S1, S2, S5 and S6, SRLA (USDA 2008).

Management Objectives	Standard	Standard - Forest- wide or LAU acre limitation (2008)	Standard - Forest-wide or LAU acres remaining as of 2019. Data includes maximum acres affected from SBEADMR	Comments; and cumulative addition to caps as a result of the Wilder-Highlands MPB Response Project added to the baseline
<p>All Management Practices and Activities -</p> <p>Objective O1: Maintain or restore lynx habitat connectivity in and between LAUs and in linkage areas.</p> <p>Objective VEG O2 – Provide for a mosaic of habitat conditions through time to support dense horizontal cover, and high densities of snowshoe hare. Provide winter snowshoe habitat in both the stand initiation structural stage and in mature, multi-story conifer vegetation.</p> <p>Objective VEG O3 – Conduct fire use activities to restore ecological processes and maintain or improve</p>	<p>All S1 Standard– New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.</p> <p>Influence of roads and Highways Seasonal Average Daily Traffic counts (SADT) are 851 at Taylor Canyon Road near Spring Creek Road.</p>	None	None	<p>Attainment occurs at the project-level through project layout and implementation of Design Features. There are no linkage areas included in the project area.</p>
	<p>Standard VEG S1 – If more than 30 percent of the lynx habitat in an LAU is currently in the stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects</p>	<p>LAU level standard – cannot exceed 30 percent of an LAU in an unsuitable condition.</p>	<p>Acres remaining for Fossil Ridge LAU: 9,647</p>	<p>The project will convert an estimated 231 acres to an unsuitable condition, reducing the remaining acres to 9,416.</p>
	<p>Standard VEG S2 – Timber Management shall not regenerate more than 15 percent of lynx habitat on NFS lands within the LAU over a 10-year period.</p>	<p>LAU level standard – cannot exceed 15 percent of an LAU in an unsuitable condition from management actions.</p>	<p>Acres remaining for Fossil Ridge LAU: 9,647</p>	<p>The project will convert an estimated 231 acres to an unsuitable condition. This is 0.63% of the lynx habitat in the LAU converted to an unsuitable condition during the life of the project.</p>

	<p>VEG S5 Standard – Pre-commercial thinning practices and similar activities intended to reduce seedling/sapling density are subject to within 200 feet of administrative sites, dwellings, or out- buildings or conifer removal in aspen where aspen is in decline.</p>	<p>Exemption-Pre-commercial thinning in WUI is limited to 3% of the total lynx habitat on the Forest. Total acres available = 42,424</p> <p>Exceptions 1-4 (VEG S5) and exceptions 1-3 (VEG S6) allow combined treatment up to 0.5% of the lynx habitat on the Forest. Total acres available = 7,071</p>	<p>Acres remaining Forest-wide: 42,293</p> <p>Acres remaining Forest-wide: 2,573</p>	<p>A total of 131 acres of WUI treatment has been completed or 0.3% of the total cap.</p> <p>The project is estimated to affect 675 acres of lynx habitat from precommercial thinning, reducing the cap to 41,618.</p> <p>A total of 227 acres under exception 3 in VEG S6 is affected, reducing the cap to 2,346.</p>
	<p>Standard VEG S6 – Vegetation management treatments that reduce snowshoe hare habitat in multi-story spruce-fir mature or late successional conifer forest may only occur: 1) within 200 feet of administrative sites, outbuildings, recreation sites, etc; 2) for research studies; 3) for incidental removal during salvage harvest; or 4) when uneven aged management (single tree or group selection) are employed to maintain or encourage multi-story attributes.</p>			

In 1999, the Colorado Parks and Wildlife (CPW) initiated a lynx recovery program intended to augment any existing populations in the Southern Rockies with transplants from Canada and Alaska to re-establish a self-sustaining breeding population. The augmentation program resulted in a total of 218 lynx being transplanted into the San Juan Mountains from 1999-2006. In 2010, CPW declared the lynx reintroduction program a success, in part because Colorado-born lynx had successfully produced third-generation Colorado kittens (Colorado Parks and Wildlife 2010). In addition to the core use area in the San Juan Mountains that likely harbors the majority of lynx in Colorado, lynx established a core use area in the Taylor Park and Collegiate Peaks Wilderness area in central Colorado (Shenk 2009B), overlapping the GMUG and White River National Forests. This core use area corresponds with a lynx high intensity-use area based on CPW radio-telemetry data (Theobald and Shenk 2011).

Through radio-telemetry CPW researchers confirmed lynx presence, dispersal and reproduction on the Grand Mesa, Uncompahgre and Gunnison National Forests. From February 4, 1999 through February 1, 2005, 121 individual lynx were located within the Grand Mesa, Uncompahgre and Gunnison National Forests (Shenk 2005). CPW documented 10 lynx dens and 32 kittens produced on the GMUG National Forests from 2003 – 2010 (Dr. J. Ivan, pers. comm. 2017). Using location data, CPW estimated nine individual lynx established home ranges intercepting the GMUG National Forests from 2000 - 2005 (Dr. J. Ivan, pers. comm. 2017). There are likely many more lynx that travelled through the area, or lynx that in fact lived in the area but not enough locations were obtained to meet the minimum sideboards of the

home range exercise; as such this is an indication of the minimum number of lynx that lived on the GMUG (Dr. J. Ivan, pers. comm. 2017).

Based on lynx location information and den site information (1999 – 2011, Dr. Jake Ivan, Wildlife Researcher, personal communication with Angela Gatto on 11/9/18), there were lynx locations in the Fossil Ridge LAU. Based on the raw location data and home range estimators used to analyze raw data, only the Rocky Brook and Upper Taylor LAUs actually held resident lynx that had established home ranges. Lynx high-use areas are located about 15 miles away in the Rocky Brook LAU and 18 miles away in the Upper Taylor LAU northeast from the nearest lynx habitat in the project area. There are fewer locations from a variety of individuals in the Fossil Ridge LAU, which suggests that use of the Fossil Ridge LAU was largely by animals moving through it, rather than residents.

CPW monitoring of radio-collared lynx from April 2000 to April 2009 (Shenk 2009; Theobald and Shenk 2011) indicates that the Wilder-Highlands Mountain Pine Beetle Response project is not located near or within lynx core use areas. Based on population-level utilization distribution for 118 lynx, there are no low, moderate, or high-intensity lynx use areas overlapping the proposed project or the Fossil Ridge LAU. This is based on radio-telemetry data from a subset of the lynx (118) reintroduced to Colorado during the 1999 to 2006 time period (Theobald and Shenk 2011). Figure 5 identifies low-intensity, moderate, and high use areas in relation to the project and LAU. Please refer to Theobald and Shenk (2011) for methodology and descriptions of the data and how they conducted their analysis of habitat use.

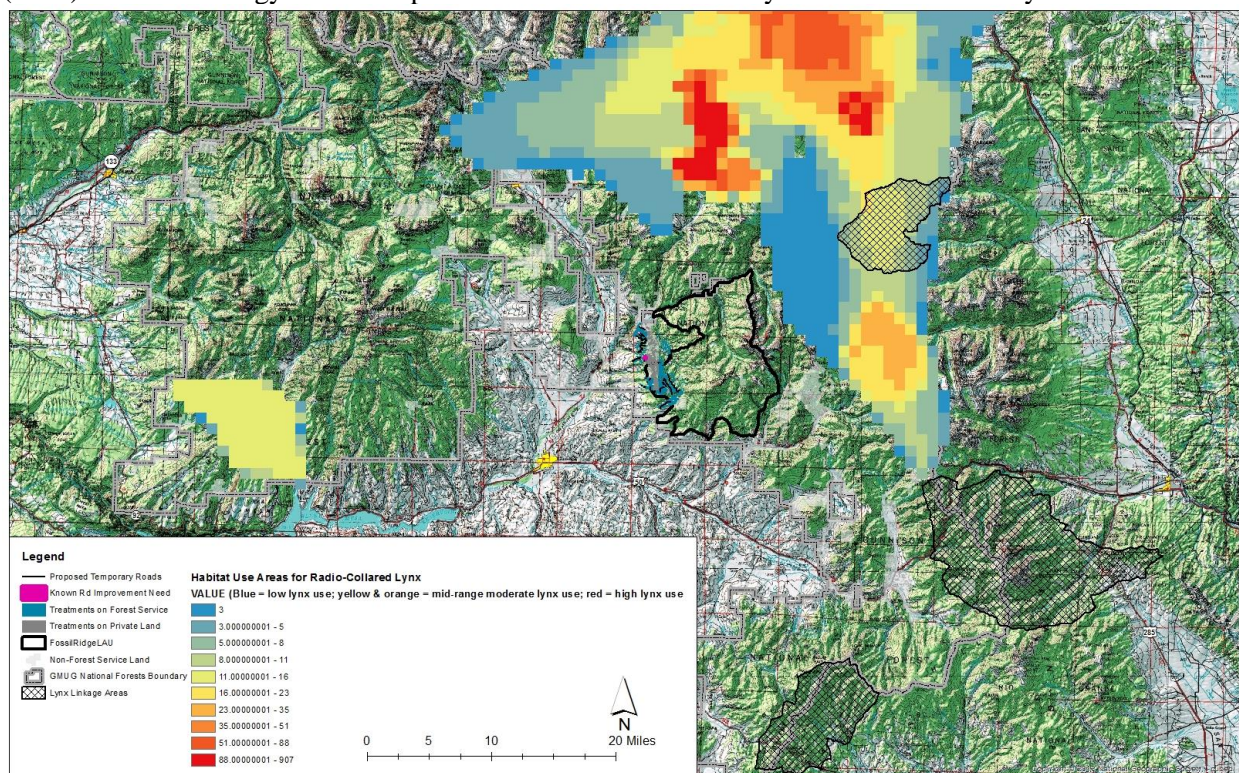


Figure 5. Population-level utilization distribution for 118 lynx. This map identifies low, moderate, and high-intensity lynx use areas and proximity of use areas to the proposed project, based on radio-telemetry data from a subset of the lynx reintroduced to Colorado during the 1999 to 2006 time period (Theobald and Shenk 2011). Low-intensity use is shown in blue, moderate in yellow and orange, high in red. This data may not reflect current lynx habitat use and does not identify travel corridors between habitat use areas.

Shenk (2009A; 2009B) describes daytime lynx habitat use at the landscape scale based on 10,935 aerial locations of lynx from February 1999 – August 2008. Engelmann spruce/subalpine fir was the dominant cover used by lynx year-round, followed by a mix of Engelmann spruce, subalpine fir and aspen as the

second most common cover type and various riparian and riparian-mix areas as the third most common cover type used. Use of riparian areas increased in July, peaked in November, and dropped off December through June. Site-scale habitat plots also indicated that Engelmann spruce and subalpine fir were the most common forest stands used by lynx for all activities during winter. While Engelmann spruce and subalpine fir occurred in similar densities at kill sites, long beds and travel sites, den sites contained twice the density of subalpine firs found at all other sites (Shenk 2009A; 2009B). Theobald and Shenk (2011) described that the average elevation for lynx habitat use was 10,780 feet, with the majority of habitat located between 9,900 – 11,620 feet.

For more detailed information on habitat requirements, life history, biology and ecology of the Canada lynx please see the biological assessment and biological opinion for the SRLA, available online at: <http://www.fs.usda.gov/detail/r2/landmanagement/planning/?cid=stelprdb5356865>. For specific information on the Canada lynx for the GMUG National Forests, please see the Canada Lynx Species Overview for the Forest Plan Revision, available: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd575421.pdf, pages 42 - 54.

Effects Analysis (Direct and Indirect Effects)

Compliance with the Southern Rockies Lynx Amendment

Lynx Management Direction

The Canada lynx was listed as threatened on March 24, 2000 (http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2000_register&docid=00-7145-filed.pdf). In August 2013, the Third Edition of the Canada Lynx Conservation Assessment and Strategy (LCAS) was released, to provide a consistent and effective approach to conserve Canada lynx on federal lands (Interagency Lynx Biology Team 2013). The Canada lynx Conservation agreement (USDA Forest Service & USDI Fish and Wildlife Service 2005) identifies the Science Report (Ruggiero et al. 2000) and the LCAS (Ruediger et al. 2000 – 1st Edition) as including the best available science. In 2008, the Southern Rockies Lynx Management Direction Record of Decision on the Southern Rockies Lynx Amendment (SRLA) was published, which amended the Forest Plan (<https://www.fs.usda.gov/detail/r2/landmanagement/planning/?cid=stelprdb5356865>). The Science Report (Ruggiero et al. 2000) is a compilation and interpretation of scientific knowledge on lynx, its primary prey and habitat relationships. The LCAS (Ruediger et al. 2000; Interagency Lynx Biology Team 2013) builds upon this scientific base and identifies the risks to the species that may occur as a result of federal land management and recommends conservation measures to remove or minimize the identified risks. Collectively, the Science Report, the LCAS, other relevant science, and locally specific information as appropriate provide the best available scientific information. These scientific sources of information were reviewed to inform the lynx effects analysis in this biological assessment.

Compliance with SRLA Objectives, Standards and Guidelines

All objectives, standards and guidelines from the SRLA (<https://www.fs.usda.gov/detail/r2/landmanagement/planning/?cid=stelprdb5356865>) were reviewed. The following are applicable to the proposed project. Table 7 provides the rationale on how the project meets the SRLA direction.

Table 7. Project consistency with all applicable SRLA objectives, standards and guidelines.

SRLA Direction	Compliance
<p>Objective HU O1. Maintain the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat.</p>	<p>All proposed activities would not occur in winter therefore would not contribute to snow compaction.</p>
<p>Objective ALL O1/Standard ALL S1. Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas/New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in a LAU and/or linkage area.</p>	<p>The project does not occur within a mapped linkage area. The project is not at a scale which precludes habitat linkage and connectivity within the Fossil Ridge LAU or between adjacent LAUs. The project will remove lodgepole pine trees in predominantly lodgepole pine stands. Pure lodgepole pine forests do not provide the horizontal cover to support snowshoe hares, the main prey item of lynx. However, lodgepole pine forests do function to provide forested cover and connectivity for movements. While the project will reduce lodgepole pine tree cover, where treatments occur in lynx habitat (the southern 1/3 of the project area) those stands also contain aspen and spruce-fir, which will not be harvested. This will retain forest cover and habitat connectivity functionality on the landscape. Landscape connectivity would not be compromised by this project since 97.5% of the lynx habitat would remain untreated in the action area.</p>
<p>Objective VEG O1. Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.</p>	<p>The project will achieve multiple ecological outcomes, including simulating natural succession and disturbance, by applying treatments that will achieve a diversity of forest structure, and maintaining snags and downed wood. Where treatments occur in lynx habitat, treatments will focus on removal of beetle infested lodgepole pine, and other tree species not targeted, including aspen and spruce-fir, will continue to provide forested habitat suitable for lynx. Post treatment, we anticipate robust grasses/forbs within about 3 years, and within 6 years we anticipate robust tree regeneration adding age-class diversity on the landscape.</p>
<p>Objective VEG O2. Provide a mosaic of habitat conditions through time that support dense horizontal cover, and high densities of snowshoe hare. Provide winter snowshoe hare habitat in both the stand initiation structural stage and in mature, multi-story conifer vegetation.</p>	<p>The majority of lynx habitat in treatment units is multi-storied, with two – three tree species present in stands (lodgepole pine, aspen, spruce-fir). Over time, post treatment response should result in robust regeneration of lodgepole pine, and aspen due to aspen prevalence in treatment units. Aspen is not a target species for harvest, but we do anticipate aspen to respond positively to the disturbance. Treatments will result in increased age-class diversity of forest stands. Understory spruce-fir regeneration will be protected and avoided during operations.</p> <p>Younger trees in the understory would be expected to release (or grow more quickly) following treatments. Tree species other than lodgepole pine would be retained.</p>

Table 7. Project consistency with all applicable SRLA objectives, standards and guidelines.

SRLA Direction	Compliance
<p>Objective VEG O4. Focus vegetation management in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover.</p>	<p>Treatments are on the periphery of the Fossil Ridge LAU, near the sagebrush-forest interface where lodgepole pine and aspen are dominant forest types on the landscape. These areas lack dense horizontal cover due to the drier, lodgepole pine forest types located at the lower elevation range of lynx habitat. The proposed treatments have the potential to increase lodgepole pine regeneration. Dense, young lodgepole pine, once it reaches a height above the average snow depth, provides excellent winter habitat for snowshoe hares and is known to harbor high densities of hares during this early successional stage. The project is likely to result in a temporary increase in dense horizontal cover once lodgepole pine regenerates post-treatment.</p>
<p>Standard VEG S1. If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.</p>	<p>Under the current environmental baseline for lynx habitat in the Fossil Ridge LAU, there is no habitat mapped as unsuitable. The project will convert up to 231 acres of currently suitable habitat to a stand initiation structural stage. This is 0.63% of the lynx habitat in the LAU.</p>
<p>Standard VEG S2. Timber management projects shall not regenerate more than 15 percent of lynx habitat on NFS lands within an LAU in a ten-year period. This 15 percent includes the entire stand within an even-age regeneration area, and only the patch opening areas within group selections. Salvage harvest within stands killed by insect epidemics, wildfire, etc. does not add to the 15 percent, unless the harvest treatment would cause the lynx habitat to change to an unsuitable condition.</p>	<p>The proposed treatments target beetle-infested lodgepole pine trees using treatment methods based on the condition of the stands as influenced by the beetle epidemic. Harvest treatments will not convert any lynx habitat to an unsuitable condition due to the amount of other tree species present in treatment units, including aspen and spruce-fir. Species other than lodgepole will be retained and protected during harvest operations. We anticipate a reduction in snowshoe hare habitat quality from precommercial treatments, addressed under Standard VEG S5, and a reduction of winter snowshoe hare habitat due to incidental impacts, addressed under Standard VEG S6. We estimate a total of 231 acres converted to an unsuitable condition from the project, and 675 acres that will be affected by even-age management precommercial thinning prescriptions. When added to other projects that will affect this LAU during a 10-year period (SBEADMR Project and Taylor Park Vegetation Management Project), less than 15% of the lynx habitat in the LAU will be regenerated. Both SBEADMR and Taylor Park have triggers that go into effect when management actions convert 10% or more lynx habitat to an unsuitable condition. This is tracked annually.</p>
<p>Standard VEG S5. Precommercial thinning practices and similar activities intended to reduce seedling/sapling density are subject to the following limitations from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat.</p>	<p>The proposed action is a HFRA project in the WUI and includes precommercial thinning prescriptions. Treatments in lynx habitat may be a combination of precommercial thinning, salvage, and sanitation, depending on stand conditions as influenced by the Mountain Pine Beetle. For this analysis, we assume that precommercial thinning could occur in all lynx habitat in treatment units. Of the 906 acres of lynx</p>

Table 7. Project consistency with all applicable SRLA objectives, standards and guidelines.

SRLA Direction	Compliance
<p>Precommercial thinning may occur only: (VEG S5 Exceptions)</p> <ol style="list-style-type: none"> 1. Within 200 feet of administrative sites, dwellings, or outbuildings; or 2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or 3. For conifer removal in aspen, or daylight thinning around individual aspen trees, where aspen is in decline; or 4. Based on new information that is peer reviewed and accepted by the regional/state levels of the Forest Service and FWS, where a written determination states: <ol style="list-style-type: none"> a) That a project is not likely to adversely affect lynx; or b) That a project is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat. 5. In addition to the above exceptions (and above and beyond the three percent limitation for fuels projects within the WUI), precommercial thinning may occur provided that: <ol style="list-style-type: none"> a) The additional precommercial thinning does not exceed one percent of the lynx habitat in any LAU for the life of this amendment, and the amount and distribution of winter snowshoe hare habitat within the LAU must be provided through appropriate site-specific analysis and consultation; and b) Precommercial thinning in LAUs with more than 30 percent of the lynx habitat currently in the stand initiation structural stage is limited to areas that do not yet provide winter snowshoe hare habitat; and c) Projects are designed to maintain lynx habitat connectivity and provide snowshoe hare habitat over the long term; and d) Monitoring is used to determine snowshoe hare response. <p>Exceptions 2 and 3 may not occur in any LAU in which VEG S1 is exceeded (i.e., more than 30 percent of LAU in stand initiation structural stage).</p> <p><u>Note:</u> This standard is intended to provide snowshoe hare habitat while permitting some thinning, to explore methods to sustain snowshoe hare habitat over time, reduce hazardous fuels, improve forest health, and increase timber production. Project design must ensure any precommercial thinning provides an appropriate amount and distribution of snowshoe hare habitat with each LAU over time, and maintains lynx habitat connectivity within and between LAUs. Project design should focus on</p>	<p>habitat affected by this project, precommercial thinning could reduce habitat quality in 675 acres.</p> <p>Under the WUI Fuels Exemption for Standard VEG S5, Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, or VEG S6 may occur on no more than three percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forests) for the life of this amendment. When adding 675 acres to the acres already reported under this Exemption as shown above in the Environmental Baseline (Table 6), this project does not exceed the 3% Forest-wide cap.</p> <p>If clumps of young, healthy seedlings and saplings are found in areas of open canopy, the clump may be retained to provide vertical diversity, wildlife cover, visual screening, and a young tree component. Of the lynx habitat potentially affected, the habitat is dominated by lodgepole pine and aspen. According to GIS analysis of FS Veg data, spruce-fir comprises no more than 10% of any stand in treatment units. Precommercial thinning will occur in lodgepole pine dominated stands and spruce-fir will be retained. These stands also have a high percentage of aspen, which will be retained and likely to increase following treatments.</p>

Table 7. Project consistency with all applicable SRLA objectives, standards and guidelines.

SRLA Direction	Compliance
creating irregular shapes for the thinning units, creating mosaics of thinned and unthinned areas, and using variable density thinning, etc.	
<p>Standard VEG S6. Vegetation management projects that reduce winter snowshoe hare habitat in multi-story mature or late successional conifer forests may occur only (VEG S6 Exceptions):</p> <ol style="list-style-type: none"> 1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or 2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or 3. For incidental removal during salvage harvest (e.g., removal due to location of skid trails); or 4. Where uneven-aged management (single tree and small group selection) practices are employed to maintain and encourage multi-story attributes as part of gap dynamics. Project design must be consistent with VEG O1, O2 and O4, except where impacts to areas of dense horizontal cover are incidental to activities under this exception (e.g., construction of skid trails). 	<p>Exception 3 applies to this project. We estimate a reduction of winter snowshoe hare habitat of up to 227 acres due to incidental removal.</p> <p>Assumptions:</p> <ul style="list-style-type: none"> • Skid trails needed to remove beetle-impacted lodgepole pine trees will affect approximately 25% of the stands in treatment units. • There are 906 acres of suitable lynx habitat in treatment units (702 acres in Forest Service treatments, and 204 acres in private land treatments). • $25\% (0.25) \times 906 \text{ acres} = 227$
<p>Guideline VEG G1. Vegetation management projects should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). Winter snowshoe hare habitat should be near denning habitat.</p>	<p>Where lodgepole pine would be removed in lynx habitat, aspen and spruce-fir trees will not be harvested and advanced conifer regeneration will be protected except where incidental loss is unavoidable (per Standard VEG S6). Removal of overstory lodgepole will promote release of the understory aspen and spruce-fir, resulting in increased snowshoe hare habitat over time.</p>
<p>Guideline VEG G5. Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.</p>	<p>Due to the small amount of habitat affected by the project relative to the amount of suitable lynx habitat available in the LAU (97.5% of lynx habitat in the LAU will not be affected), habitat for alternate prey species will remain abundant. Red squirrels are common and use a variety of habitats. Although conifer seeds are their primary food source, red squirrels are true omnivores. Red squirrel habitat is found throughout the project area and in the Fossil Ridge LAU.</p>

Table 7. Project consistency with all applicable SRLA objectives, standards and guidelines.

SRLA Direction	Compliance
Guideline VEG G10. Fuel treatment projects within the WUI as defined by HFRA should be designed considering Standards VEG S1, S2, S5, and S6 to promote lynx conservation.	See description of compliance under Standards VEG S1, S2, S5, and S6.
Guideline VEG G11. Denning habitat should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small wind thrown trees (“jack-strawed” piles). If denning habitat appears to be lacking in the LAU, then projects should be designed to retain some coarse woody debris, piles, or residual trees to provide denning habitat in the future.	<p>The following project design features will retain coarse woody debris and residual trees:</p> <ul style="list-style-type: none"> • Maintain 10 - 15 tons per acre of downed wood (woody material >3” diameter) within harvest units outside of the fuel break areas. • Maintain large diameter downed logs in various stages of decomposition within harvest units (50 linear feet/acre of 10 inches diameter or larger at the large end of lodgepole pine and aspen logs) outside of fuel break areas. • For lodgepole pine stands, maintain a minimum of 300 snags per 100 acres, with a minimum DBH of 10”, where physically and biologically capable outside of fuel break areas. Snags do not need to be retained on every acre.

Direct and Indirect Effects

This project will affect up to 445 acres of primary suitable and 257 acres of secondary suitable lynx habitat on Forest Service lands; and 107 acres of primary suitable and 97 acres of secondary suitable lynx habitat on private lands. Currently, there is no habitat identified as unsuitable within the Fossil Ridge LAU. The majority of treatment acres will occur in non-habitat (2,163 acres).

Table 8. Estimated net change in lynx habitat in the Fossil Ridge LAU resulting from the project.

Habitat Description	Total Acres Affected by Project	Acres affected due to reduction in habitat quality but not converted to unsuitable	Acres converted to Unsuitable from incidental habitat loss (e.g., skid trails)	Acres converted to unsuitable from temporary roads	Net Change LAU Statistics	Updated Acres of Habitat in LAU	Updated % of Lynx habitat in LAU
Primary Suitable	552	411.2	138	2.8	-140.8	25,577.2	69.94%

Secondary Suitable	354	263.8	89	1.2	-90.2	10,762.8	29.43%
Unsuitable (Stand Initiation Structural Stage)	0	0	227	4	+231	231	0.63%
Total Lynx Habitat	906	675	227	4	231	36,571	100
Non-habitat	2,163	N/A	N/A	N/A	N/A	18,555	N/A

Up to 906 acres of suitable lynx habitat will be affected (702 acres from treatments on Forest Service land, and 204 acres from treatments on private land). Based on GIS analysis of mapped lynx habitat and FS Veg data and its overlap with the proposed treatment units on Forest Service and private lands, the treatments will reduce lynx habitat quality due to overstory removal of beetle-impacted lodgepole pine trees, understory removal of young lodgepole pine trees from commercial timber harvest and precommercial thinning treatments, incidental loss of habitat due to skid trails, and habitat loss from temporary roads. Treatments will not convert any habitat to an unsuitable condition due to the amount of other tree species present in treatment units that will remain (aspen and spruce-fir). Treatment units in lynx habitat have a high percentage of aspen, with lesser amounts of Engelmann spruce and subalpine fir. While habitat quality will be reduced, particularly habitat quality for snowshoe hares, enough aspen and other coniferous forest cover will remain after lodgepole is removed to still provide functional habitat.

For this analysis, we assume that precommercial thinning could occur in all of the lynx habitat acres affected by this project. Of those 906 acres, precommercial thinning could reduce snowshoe hare habitat quality on 675 acres, adding this amount to the GMUG National Forests Veg S5 Forest-wide cap. The amount and density of horizontal cover determine snowshoe hare abundance. Snowshoe hares avoid precommercially-thinned areas due to the decline in security cover (Ellsworth and Reynolds 2006 and Interagency Lynx Biology Team 2013). However, snowshoe hare may use the stands for forage if dense cover/refugia are nearby. With refugia, there may be a minimal reduction in snowshoe hare and as a result, a minimal effect to lynx (Ellsworth and Reynolds 2006). Due to the amount of aspen present in treatment units in lynx habitat combined with lesser amounts of spruce-fir (up to 10% of stands), dense cover/refugia area likely to be maintained.

Trees that are damaged or dying due to insects and disease would be removed from treatment stands. Advanced tree regeneration is protected and maintained during operations, except as impacted incidentally. There will be an incidental loss of lynx habitat dense horizontal cover from tree removal operations, including skid trails, landings and incidental damage to understory trees and vegetation. To account for this impact, we assume an incidental loss of up to 25% of lynx habitat in treatment units. To maintain consistency with past approaches in estimating incidental habitat loss, we are assuming 25% consistent with the approach taken in the Spruce Beetle Epidemic and Aspen Decline Management Response EIS and BA (<https://www.fs.usda.gov/project/?project=42387>). Based on this assumption, up to 176 acres of lynx habitat in Forest Service treatment units and up to 51 acres of lynx habitat in private

land treatment units could be converted to an unsuitable condition due to incidental damage. This adds a total of 227 acres to the GMUG National Forests Veg S6 Forest-wide cap under the SRLA.

According to the SRLA, incidental damage from temporary roads, landings, salvage harvest, and trees damaged or killed from felling other trees represents a 15-20% reduction in the understory. For this project, as discussed above, we use a more conservative estimate of 25% believing this to more accurately reflect true incidental loss from these types of activities. This means there would be a reduction in winter forage and escape cover for snowshoe hare, but there would be dense pockets of advanced regeneration left in place. Trees within stands that currently provide excellent horizontal cover at less than 6 feet from the forest floor would not be cut. Reduced understories could lead to a decline in prey availability in the 906 acres of lynx habitat that will be affected. Additionally, we anticipate a reduction in coarse woody debris in treatment units, further reducing habitat quality. Coarse woody debris retention, consistent with Forest Plan direction, is included as part of the project design described in the Project Design Features. Existing coarse woody debris would be retained outside of treatment units.

Commercial timber harvest would reduce the spatial arrangement, amount, and density of vegetation that provides dense horizontal cover above six feet, or the average snow depth for snowshoe hare. Overstory removal would reduce canopy cover, and lynx select areas of high canopy cover on a broad scale (Vanbianchi et al. 2017). Treatments occurring in lynx habitat may reduce cover and alter the preferred winter habitat of snowshoe hares. Lynx may abandon cutting units because of the lack of cover and reduction in prey availability, or instead select areas in cutting units that maintain cover, such as pockets of dense regeneration on a fine scale (Koehler and Brittell 1990, Vanbianchi et al. 2017).

Lynx in the southern Rockies are sensitive to changes in forest structure (Squires et al. 2013, Koehler and Brittell 1990, Squires 2010). Because proposed treatments would reduce overstory and understory vegetation and remove down wood, snowshoe hare habitat and the quality of lynx habitat would be reduced over the short and long term (greater than 10 years) (Squires et al. 2013, Squires 2010). Thinning could also affect lynx movement across the landscape and can alter lynx distribution within their home range (Squires et al. 2010). Given the project location on the landscape relative to lynx core population areas, lynx linkage areas, and documented home ranges within other LAUs (North Taylor and Rocky Brook LAUs as described in the Environmental baseline), this project is unlikely to affect lynx distribution within a home range, but could affect landscape-level lynx movements if they travel through the project area during implementation.

In the long term (25 years), treatments would contribute to an increase in understory vegetation density because openings in the overstory allow for pockets of tree regeneration to establish. This would increase winter cover available for snowshoe hares and thus increase prey availability for lynx. Holbrook et al. (2018) found that Canada lynx use silviculture treatments, but there is a temporal lag depending on the treatment types. More importantly the adjacent habitat to treatment sites had a stronger influence on post-treatment use. The southern 1/3 of the project area contains the most diverse and suitable lynx habitat, predominantly lodgepole, aspen, and conifer-aspen mixed stands with some spruce-fir. The southern 1/3 of the project area and habitat adjacent to it has the highest potential for lynx habitat use.

There are two miles of proposed temporary roads within lynx habitat. Temporary roads will have an average footprint of ground disturbance of about 16 feet in width. The disturbance footprint varies based on terrain and slope such that where temporary roads are on flat ground the width will be about 14 feet, and on steeper cross slopes it will be 20 – 22 feet. Vegetation cover type will also influence width. Where temporary roads go through non-forested areas, the width will be narrow, and in forested areas the width will be wider. The average width of 16 feet accounts for these variables. This equates to four acres of lynx habitat that will be converted to an unsuitable condition from temporary roads. Combined with the

amount converted to unsuitable from incidental habitat loss above, a total of 231 acres will be converted to unsuitable from this project.

The project area will temporarily receive added human use during implementation that may be considered high human use compared to the current condition. Areas of high human use can interrupt habitat connectivity and further fragment lynx habitat (Ruediger et al. 2000). The construction of temporary roads and the use of roads for hauling can influence the ability of lynx to travel through the area. As quantified above, road construction reduces lynx habitat by removing forest cover. Conversely lynx have been documented using less traveled roads where the adjacent vegetation provides good hare habitat. Squires et al. (2010) concluded that forest roads with low vehicular traffic had little effect on lynx seasonal resource-selection patterns in Montana. Potential impacts are reduced when access, traffic volume, and road speed are reduced. Access would be kept to the minimum required to accomplish project activities by not allowing public use of temporary roads during implementation and closing (decommissioning) all temporary roads post-treatment, essentially putting the temporary roads back on a path to habitat restoration and recovery.

There are 2,163 treatment acres located in what is described as non-habitat for lynx. These acres do not meet the SRLA habitat mapping criteria and most of those acres do not occur in a Lynx Analysis Unit. While they do not meet lynx habitat mapping criteria in terms of providing the necessary habitat components to support snowshoe hares, forested habitat provides habitat connectivity and could be used by dispersing or traveling lynx. At a landscape scale, these acres are on the periphery of forested habitat, at an elevation zone of transition between forested and non-forested ecosystems. As described in the Environmental Baseline, due to the location and distance from lynx linkage areas east of the project in Taylor Park and southeast of the project on Monarch Pass along the Continental Divide, and distance to lynx core population areas in the North Taylor Park area northeast of the project and the San Juan Mountains southwest of the project, these treatments in non-habitat should not impact lynx habitat connectivity nor impede lynx movements.

The proposed project and associated human activity does not occur in habitat with the necessary habitat elements required by lynx for denning (CPW researchers have documented that lynx den sites occur at high elevations on north-facing slopes with abundant coarse woody debris in the form of jackstraw piles and root wads, largely in subalpine spruce-fir forest). Lynx are unlikely to be denning in areas close enough to be impacted by the proposed action. The chance that human activity will occur close to a den site is very improbable considering the amount of habitat available elsewhere in the affected LAU and adjacent LAUs, and due to the lack of documented lynx activity in the vicinity of the project. If human activity does occur near a lynx den, a female with kittens is more likely to move her kittens away from the disturbance, rather than abandon her litter as a result of the disturbance (U.S. Fish and Wildlife Service 2010). Coincidentally, the elk calving timing restriction included as one of the project design features and as shown in Figure 2 (mapped elk production area) includes most of the lynx habitat in the project area. This timing restriction also overlaps the denning time period for lynx. If a female lynx chooses to den and raise kittens there, the elk calving timing restriction will prevent disturbance to lynx during this critical period.

There is the potential for lynx to be disturbed and displaced from the project activities. Noise disturbance from temporary road construction, implementing treatments, tree removal and hauling, and closure of temporary roads after treatments are complete all have the potential to disturb lynx and cause them to avoid the area. The likelihood of this affect is considered insignificant and discountable (difficult to quantify or measure), due to low lynx population density and lack of documented lynx habitat use in the project area and Fossil Ridge LAU based on data from Theobald and Shenk (2011). Lynx habitat in the project area is marginal due to the low percent of spruce-fir cover in the project area (0 – 10%), resulting in lower habitat quality for snowshoe hares, the main prey item of lynx.

Determinations of Effect and Rationale

The proposed action **May affect** the Canada lynx due to:

- Lynx may be temporarily disturbed and displaced due to project activities, including temporary road construction and use, and implementation of treatments and tree removal.
- Treatments in lynx habitat reduce lynx habitat quality (but do not convert to an unsuitable condition) on approximately 675 acres; and convert an estimated 231 acres of habitat to an unsuitable condition (stand initiation structural stage), for an estimated time period of 25 – 40 years. Within treatment units, regeneration may occur more quickly. On past similar projects, robust lodgepole and aspen regeneration was documented within 3 – 6 years post-treatment. While tree regeneration may be relatively fast, we expect a longer time period to become suitable again as lynx habitat.

The proposed action is **not likely to adversely affect** the Canada lynx because:

- The effects are expected to be insignificant (unmeasurable, and would not reach the level of take), and/or discountable, because:
 - Activities will not occur in lynx high, medium or low intensity use areas and the project does not occur in core population areas.
 - The likelihood of a lynx being present when such activities occur is remote and unpredictable.
 - Lynx are unlikely to be denning in areas close enough to be impacted. The chance that humans will pass close to a den site is very improbable considering the large amount of habitat available elsewhere in the affected LAU and adjacent LAUs, and the low lynx population level.
 - At the LAU scale, only 2.5 percent of lynx habitat in the Fossil Ridge LAU will be affected, increasing unsuitable habitat in the LAU by less than 1 percent.

Environmental Baseline for Gunnison Sage-Grouse

Life History, Designated Critical Habitat, and Threats Relevant to the Proposed Project

Sage-grouse are obligate users of sagebrush and require large, contiguous areas of sagebrush across the landscape for long-term survival. Several species of sagebrush provide the specific food, cover, and reproduction habitats critical for sage-grouse survival. Gunnison sage-grouse require a variety of habitats such as large expanses of sagebrush with a diversity of grasses and forbs and healthy wet meadow and riparian ecosystems. They require sagebrush for cover and for food in fall and winter.

In the Gunnison Basin, strutting and mating on leks occurs from March 15 to May 15. The timing can vary annually by 1 – 2 weeks depending on weather conditions, snow melt, and day-length.

Nesting typically begins in mid-April and continues into July. Most eggs hatch in June, with a peak between June 10 and June 20. Nests are located in sagebrush habitat, most within 2-4 miles of the lek (Coates et al. 2013; Holloran and Anderson 2005; Connelly et al. 2000). A study by C. Aldridge, et al. (2011), found females in the western portion of the Gunnison Basin selected nest sites in areas with a higher proportion of sagebrush cover (>5 percent) that were more productive and had a lower density of maintained roads (class 1 to class 4 [1=primary paved highway, 2=secondary paved highway, 3=light duty road, 4=primitive road, not regularly maintained]); selected nest areas within 4 miles of leks, a

moderate distance from water and farther from conifer-juniper forests (Aldridge, et al. 2011 – see Figure 3; Young et al. 2020). At a more local patch scale (0.35-mile radius from nest), females selected sagebrush patches with greater proportions of taller big sagebrush cover (>10 percent) that were a moderate distance from residential development, water sources, major roads (class 1 or class 2 [primary and secondary paved highway]) and had higher vegetation productivity (Aldridge, et al. 2011, Young et al. 2020).

Intermixing of broods and flocks of adult birds is common with the start of fall, and birds move from riparian areas to sagebrush-dominated landscapes that continue to provide green forbs. Fringed sagebrush is often a transitional food as grouse shift from summer to winter diets (Schroeder et al. 1999 cited in GSRSC 2005).

Additional life history information may be found on CPW’s Gunnison Sage-grouse Conservation website². A comprehensive life history description by Young et al. (2020) is available at: <https://birdsoftheworld.org/bow/species/gusgro/cur/introduction>. For additional information about the Gunnison sage-grouse on the GMUG National Forests, please refer to the Gunnison sage-grouse species overview prepared for the Forest Plan Revision: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd575421.pdf, pages 94 – 105.

On January 11, 2013, the USFWS proposed to protect the Gunnison sage-grouse as an endangered species under the ESA (USFWS 2013a). In 2014 the USFWS published a Final Rule listing the Gunnison sage-grouse as “threatened” (USFWS 2014a). The USFWS proposed and designated critical habitat for the species (USFWS 2013b, 2014b).

In their final rule designating critical habitat (USFWS 2014b), the USFWS identified the following five Primary Constituent Elements (PCEs) as necessary for the conservation and recovery of the species:

Landscape Specific Primary Constituent Element Primary Constituent Element 1— Extensive sagebrush landscapes capable of supporting a population of Gunnison sage-grouse. In general, this includes areas with vegetation composed primarily of sagebrush plant communities (at least 25 percent of the land is dominated by sagebrush cover within a 0.9-mi (1.5-km) radius of any given location), of sufficient size and configuration to encompass all seasonal habitats for a given population of Gunnison sage-grouse, and facilitate movements within and among populations. These areas also occur wholly within the potential historical range of Gunnison sage-grouse (GSRSC 2005, pp. 32–35, as adapted from Schroeder et al. 2004, entire).

Seasonally Specific Primary Constituent Elements Primary Constituent Element 2— Breeding habitat composed of sagebrush plant communities that, in general, have the structural characteristics within the ranges described in the following table. Habitat structure values are average values over a project area. Breeding habitat includes lek, nesting, and early brood-rearing habitats used typically March 15 through July 15 (GSRSC 2005, p. H–3). Early brood-rearing habitat may include agricultural fields.

BREEDING HABITAT STRUCTURAL GUIDELINES FOR GUNNISON SAGE-GROUSE a	
Vegetation variable	Amount in habitat
Sagebrush Canopy Cover	10–25 percent.
Non-sagebrush Canopy Cover b	5–15 percent.
Total Shrub Canopy Cover	15–40 percent.
Sagebrush Height	9.8–19.7 in (25– 50 cm).

²<http://cpw.state.co.us/learn/Pages/GunnisonSagegrouseConservationPlan.aspx>

BREEDING HABITAT STRUCTURAL GUIDELINES FOR GUNNISON SAGE-GROUSE a	
Grass Cover	10–40 percent.
Forb Cover	5–40 percent.
Grass Height	3.9–5.9 in (10– 15 cm).
Forb Height	2.0–5.9 in (5–15 cm).
<p>a Derived from GSRSC 2005, p. H–6, which depicts structural values for both arid and mesic areas in Gunnison sage-grouse habitat. Here we provide the full range of these structural values to account for this variation.</p> <p>b Includes shrubs such as horsebrush (<i>Tetradymia</i> spp.), rabbitbrush (<i>Chrysothamnus</i> spp.), bitterbrush (<i>Purshia</i> spp.), snakeweed (<i>Gutierrezia sarothrae</i>), greasewood (<i>Sarcobatus</i> spp.), winterfat (<i>Eurotia lanata</i>), Gambel’s oak (<i>Quercus gambelii</i>), snowberry (<i>Symphoricarpos oreophilus</i>), serviceberry (<i>Amelanchier</i> spp.), and chokecherry (<i>Prunus virginiana</i>).</p>	

Primary Constituent Element 3— Summer-late fall habitat composed of sagebrush plant communities that, in general, have the structural characteristics within the ranges described in the following table. Habitat structure values are average values over a project area. Summer-fall habitat includes sagebrush communities having the referenced habitat structure values, as well as agricultural fields and wet meadow or riparian habitat types. Wet meadows and riparian habitats are also included qualitatively under PCE 5 below.

SUMMER-LATE FALL HABITAT STRUCTURAL GUIDELINES FOR GUNNISON SAGE-GROUSE a b	
Vegetation variable	Amount in habitat
Sagebrush Canopy Cover	5–20 percent.
Non-sagebrush Canopy Cover c.	5–15 percent.
Total Shrub Canopy Cover	10–35 percent.
Sagebrush Height	9.8–19.7 in (25– 50 cm).
Grass Cover	10–35 percent.
Forb Cover	5–35 percent.
Grass Height	3.9–5.9 in (10– 15 cm).
Forb Height	1.2–3.9 in (3–10 cm).
<p>a Structural habitat values provided in this table do not include wet meadow or riparian habitats. Therefore, we address these habitat types under Primary Constituent Element 5 below.</p> <p>b Derived from GSRSC 2005, p. H–7, which depicts structural values for both arid and mesic areas in Gunnison sage-grouse habitat. Here we provide the full range of these structural values to account for this variation.</p> <p>c Includes shrubs such as horsebrush (<i>Tetradymia</i> spp.), rabbitbrush (<i>Chrysothamnus</i> spp.), bitterbrush (<i>Purshia</i> spp.), snakeweed (<i>Gutierrezia sarothrae</i>), greasewood (<i>Sarcobatus</i> spp.), winterfat (<i>Eurotia lanata</i>), Gambel’s oak (<i>Quercus gambelii</i>), snowberry (<i>Symphoricarpos oreophilus</i>), serviceberry (<i>Amelanchier</i> spp.), and chokecherry (<i>Prunus virginiana</i>).</p>	

Primary Constituent Element 4— Winter habitat composed of sagebrush plant communities that, in general, have sagebrush canopy cover between 30 to 40 percent and sagebrush height of 15.8 to 21.7 in (40 to 55 cm). These habitat structure values are average values over a project area. Winter habitat includes sagebrush areas within currently occupied habitat that are available (i.e., not covered by snow) to Gunnison sage-grouse during average winters (GSRSC 2005, p. H–3).

Primary Constituent Element 5— Alternative, mesic habitats used primarily in the summer-late fall season, such as riparian communities, springs, seeps, and mesic meadows (GSRSC 2005, pp. 30, H–7; Schroeder et al. 1999, p. 4; Connelly et al. 2000a, p. 980).

Within the Wilder-Highlands Mountain Pine Beetle Response project area, occupied designated critical habitat overlaps a portion of the project area along the periphery of the critical habitat designation. This area includes forested and non-forested habitats where the lodgepole pine and aspen forest types interface with shrublands and grasslands. The PCEs that may potentially be affected by the project include PCEs 2 (breeding habitat) and 3 (summer-late fall habitat). These PCEs may be affected from temporary road

development, analyzed in the Gunnison sage-grouse effects analysis.

Based on the best available scientific and commercial data, the USFWS (2014a, p. 69192) determined that the most substantial threats to Gunnison sage-grouse currently and in the future include habitat decline due to human disturbance and development, small population size and structure, drought, climate change, and disease. The U.S. Fish and Wildlife Service identified several threats to sage-grouse within the Gunnison Basin population. These include historic modification of habitat leading to habitat loss and fragmentation, roads and trails, domestic grazing and wild ungulate herbivory, invasive plants and climate change. The Wilder-Highlands Mountain Pine Beetle Response Project is most likely to interact with the threats of roads and invasive plants.

Environmental Baseline of Gunnison Sage-grouse in project and action area

Portions of project elements occur in designated critical habitat, including 4.5 miles of temporary roads, 6.7 miles of haul roads (existing open public roads) and 313 acres of Mountain Pine Beetle lodgepole pine treatment units. This location is part of the Gunnison Sage-grouse Critical Habitat Unit 6: Gunnison Basin unit (USFWS 2014b). The Gunnison Basin sage-grouse Strategic Committee (2012) and Gunnison County Geographic Information System Department (Mike Pelletier) developed a habitat prioritization tool that identifies priority Gunnison sage-grouse habitat (https://www.gunnisoncounty.org/DocumentCenter/View/8705/HabitatPrioritizationTool_2018-Update_Approved). This tool evaluates the habitat potential as a sum of the weighted scores assigned to habitat layers in combination with perceived impacts (uncontrollable threats). Habitat status is assigned as Tier 1 or Tier 2 based on the score. Tier 1 is defined as those habitats scoring 15 or higher. Tier 2 is all other habitats (<15). This model was used for broad-scale habitat review to inform this analysis and is based on best available scientific information. According to this habitat prioritization data, top priority habitat, referred to as Tier 1 habitat, does not overlap treatment units. Treatment units consist of lodgepole pine and mixed lodgepole/aspen forest that does not provide the necessary habitat requirements Gunnison sage-grouse depend on. Portions of temporary roads and portions of haul roads do overlap Tier 1 and Tier 2 habitat. The main haul road, Gunnison County Road 743, goes through Tier 1 habitat for about 4.7 miles on BLM and private lands, and about 2.5 miles on Forest Service lands.

The closest known active lek site is approximately 2.4 miles from the nearest treatment unit, 2.3 miles from the nearest temporary road, and 0.7 miles from the nearest haul route (Gunnison County Road 743). About two-thirds of the project activities are outside the 4-mile buffer of leks (Figure 6). Most sage-grouse nesting activity occurs within 4 miles of leks (Aldridge et al 2011, Patricelli et al 2013). Where project activities occur within the 4-mile buffer, they are mostly in forested habitat and forest/non-forest edges. There are 0.08 mi of temporary roads occurring in high probability areas of nest occurrence (422 feet in length with an average road width of 16 feet, equating to 0.16 ac of disturbance), and 2,043 acres of high probability areas of nest occurrence within the Gunnison sage-grouse harvest treatment action area (Aldridge et al 2011). Approximately 3.8 miles of haul roads in designated critical habitat on Forest Service and 3 miles on BLM (County Road 743) go through habitat modeled as high probability areas of nest occurrence (Figure 6).

The Gunnison sage-grouse action area extends 0.50 mile from temporary roads and haul roads, and 1 mile from treatment units into designated critical habitat (Figure 6). This distance fully captures the extent that project noise attenuates to background noise of 40 dBA or lower (Rural areas sound levels 35-40 dBA – EPA 1978). Current management strategies is to limit new noise levels to 10 dBA above background values (40 dBA for our project). Therefore the distance for the action area is within this management strategy (at 0.9 mile from treatment unit boundaries ~ 40 dBA, 0.5 mile from temporary roads ~ 39.9 dBA, and 0.5 mile from haul roads ~ 32.9 dBA – refer to Noise Assessment in **Appendix A**).

Current conditions within the action area most likely cause an existing level of disturbance that negatively affects the Gunnison sage-grouse. These actions include public use on County and federal land travel routes identified by the Motor Vehicle Use Map for recreation, hunting, camping and to access private property and residential homes on private land inholdings.

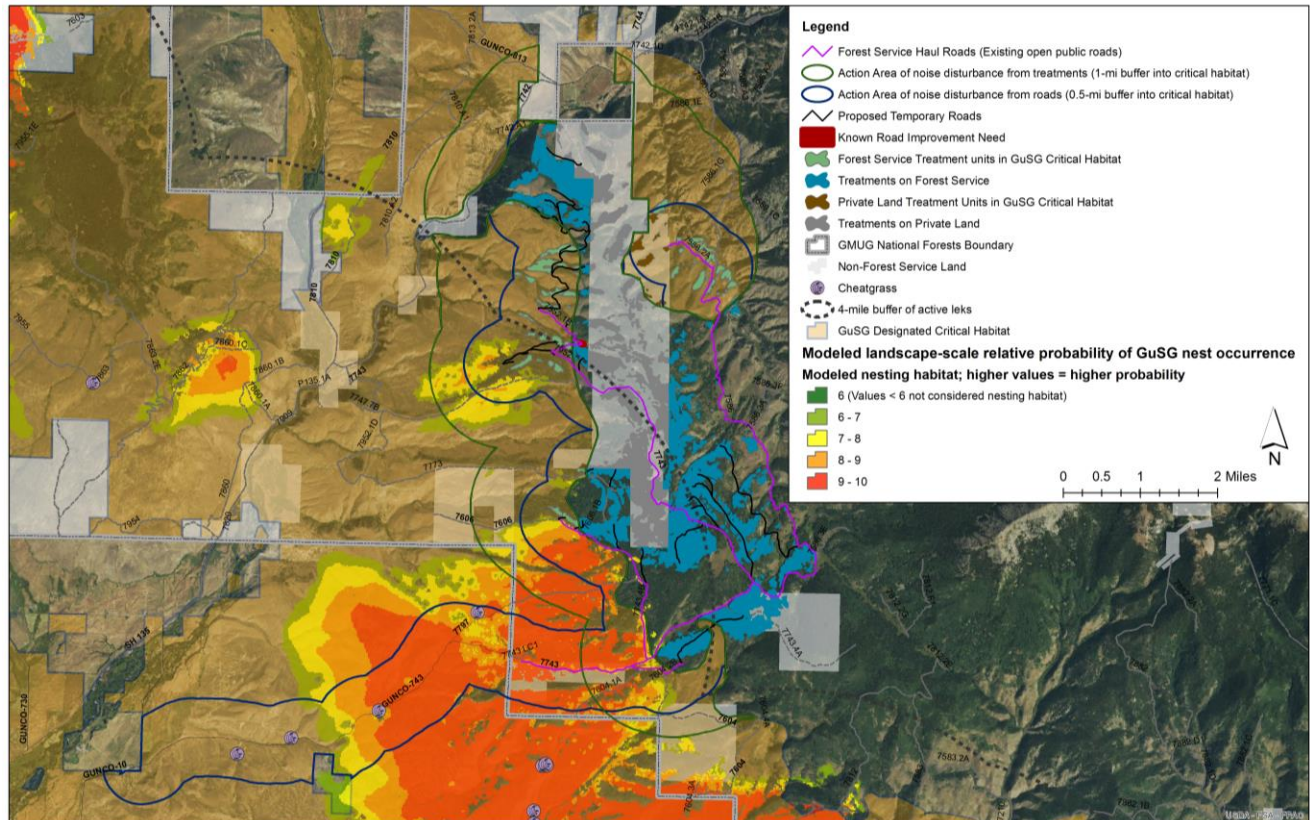


Figure 6. Action Area delineation for noise disturbance associated with roads and treatments; and modeled landscape-scale relative probability of Gunnison sage-grouse nest occurrences (Aldridge et al. 2011) in relation to treatment units, temporary roads, and haul roads.

Review of the Candidate Conservation Agreement (CCA) for the Gunnison sage-grouse

The Candidate Conservation Agreement for the Gunnison sage-grouse, Gunnison Basin Population (CPW, Gunnison County, Saguache County, BLM, FWS, FS, NPS, and NRCS 2012) was reviewed to identify applicable conservation measures that could be adopted to help reduce or prevent impacts. The Wilder-Highlands Mountain Pine Beetle Response Project is not an activity covered by the CCA; however the following *conservation measures set forth within the CCA will be applied to reduce impacts*:

- Integrated weed prevention practices (*Included in the project Design Features*)
- Habitat reclamation employed for any ground disturbance, in order to minimize establishment of invasive weeds and to accelerate restoration of habitat function (*Included in the project Design Features*)

Effects Analysis (Direct and Indirect Effects)

Table 9 describes the direct and indirect effects of the project activities, tasks, and tools or equipment on Gunnison sage-grouse and habitat. This table deconstructs the action to clearly and transparently identify the impacts, species exposure to impacts, response, effect and degree of effect.

Table 9. Deconstructing the Action Impact-Exposure-Response-Effect Relationships for Project Activities Affecting Gunnison Sage-Grouse.

Project Activity	Tasks	Tools or Equipment	Impact (stressor)	Exposure to Impact – proximity, probability Yes or No and why	Response Yes or No If yes, what is likely response	Effect If response, what is likely biological effect	Degree of effect
Harvesting trees (sanitation & salvage)	Cut trees, fuels reduction, clear log landings	Feller buncher, chainsaw, chipper-mulcher, dozer	Noise	Yes - 262 acres of treatment units occur in designated critical habitat on Forest Service lands and 51 acres of treatment units occur in designated critical habitat on private lands, primarily along the periphery of the critical habitat designation where it overlaps forested habitat.	Yes - Perceptible increase above baseline ambient noise levels may cause birds to avoid affected area, or affect behavioral responses – individuals become aware and direct attention to sound, rather than attention to life stage requirements.	Noise may impact nesting birds and brood-rearing by reducing birds' ability to detect predators, or interrupt care of chicks and feeding behavior; cause avoidance of habitat w/in affected area of increased noise. The forested stands being treated do not have any of the designated critical habitat Primary Constituent Elements (PCEs), thus no critical habitat PCEs will be affected and there will be no effect to designated critical habitat.	Increased noise and associated area of influence is measureable. Noise from equipment (tools) used to implement treatments could affect birds w/in a 1-mile distance of the treatment units. The degree or likelihood of noise interrupting individual bird's ability to detect predators or engage in other life stage behaviors cannot be meaningfully measured or evaluated, other than to acknowledge the potential for increased noise effects within the 1-mile radius. Based on modeled landscape-scale relative probability of Gunnison sage-grouse nest occurrence (USGS, Fort Collins Science Center 2011), there are approximately 2,043 acres of modeled nesting habitat within 1 mile of treatment units where noise has the greatest potential to disturb birds.

Project Activity	Tasks	Tools or Equipment	Impact (stressor)	Exposure to Impact – proximity, probability Yes or No and why	Response Yes or No If yes, what is likely response	Effect If response, what is likely biological effect	Degree of effect
Hauling harvested trees	Transport to landings	Skidder, forwarder, tethered cable system	Noise	No - Landings are not in sage-grouse habitat	No	None	None
	Transport via haul roads (haul roads are open public roads, including USFS, BLM and County jurisdiction: Roads 743 and 586)	Log trucks	Noise	Yes – 6.7 miles of haul roads have the potential to cause noise disturbance in designated critical habitat on Forest Service lands (1 mile of Road 586, 0.8 miles of Road 586.2A, 0.5 miles of Road 604, 0.1 miles of Road 604.2B, 0.7 miles of Road 606, 1.8 miles of Road 743, 0.6 miles of 743.4B, 0.4 miles of Road 952 and 0.9 miles of Road 952.1B).	Yes – Perceptible increase above baseline ambient noise levels may cause birds to avoid affected area, or affect behavioral responses – individuals become aware and direct attention to sound, rather than attention to life stage requirements.	Noise may impact nesting birds and brood-rearing by reducing birds' ability to detect predators, or interrupt care of chicks and feeding behavior; cause avoidance of habitat w/in affected area of increased noise.	Increased noise and associated area of influence is measureable. Noise from log trucks could affect area w/in a ½-mile radius of the haul roads. The degree or likelihood of noise interrupting individual bird's ability to detect predators or engage in other life stage behaviors cannot be meaningfully measured or evaluated above existing baseline levels and current impacts of public road use, other than to acknowledge the potential for increased noise effects within the ½-mile radius.
			Invasive plants – cheatgrass (most concerning stressor)	Yes - Cheatgrass is present on haul routes, primarily on BLM lands (as shown on map)	Yes – potential to increase cheatgrass, which would reduce habitat quality by outcompeting native grasses and forbs, causing a loss of native plant diversity. This increases habitat susceptibility to wildfire.	Reduction in insects and forbs due to loss of native plant species, results in less food sources for sage-grouse during spring, summer and fall. Increased fire risk increases sagebrush susceptibility to wildfire and increased risk of habitat loss.	Due to the presence of cheatgrass, this risk factor is prevalent and the potential exists for increased truck traffic to exacerbate this risk by transporting seed along the road vector, potentially contributing to cheatgrass expansion. Project design features for preventing and treating invasive plants should

Project Activity	Tasks	Tools or Equipment	Impact (stressor)	Exposure to Impact – proximity, probability Yes or No and why	Response Yes or No If yes, what is likely response	Effect If response, what is likely biological effect	Degree of effect
							prevent or minimize this potential impact.
Temporary road operation	Road construction	Dozer	Noise, soil disturbance & compaction, invasive plants	Yes – 4.5 miles of temp road construction and use will occur in designated critical habitat. Based on modeled landscape-scale relative probability of Gunnison sage-grouse nest occurrence (USGS, Fort Collins Science Center 2011), 0.08 mi (422 feet) occur in modeled habitat (high relative probability of nest occurrence, Ordinal Bins 6 – 10); and 1.6 mi occur in low relative probability of nest occurrence, Bins 1 – 5, which Aldridge et al. (2011) called non-habitat. The remaining 2.8 miles of temp roads occur in forested habitat. Where temp roads are in designated critical habitat, they occur on the periphery in the sagebrush-forest interface.	Yes – Potential for habitat response due to ground disturbance. Some temp roads will use previously closed routes that have revegetated since closed, and some temp roads will be new disturbance footprints. Rd construction will cause a temporary loss of vegetation along the routes and soil disturbance. Also increased risk of invasive plant introduction. Disturbance may cause birds to avoid the affected area, or affect behavioral responses.	Temp road construction and use will introduce noise and physical disturbance. Noise may impact nesting birds and brood-rearing success by reducing birds' ability to detect predators, interrupt care of chicks and feeding behavior; cause avoidance of habitat w/in affected area of increased noise.	There is a potential for these effects to occur. Based on modeled landscape-scale relative probability of Gunnison sage-grouse nest occurrence (USGS, Fort Collins Science Center 2011), the majority of temp roads occur in low probability of nest occurrence areas and in non-habitat (forested stands). The 4.5 miles of temp roads in designated critical habitat equates to 8.7 acres, and the 422 feet in modeled habitat with a high probability of nest occurrence equates to 0.16 acre. Of the 4.5 miles of temp roads in designated critical habitat, 2.8 miles occur in forested habitat of which 1 mile is in lodgepole pine treatment units. Due to the low amount of habitat affected (based on the extent of forested habitat) and the lack of high quality habitat within the area potentially affected by noise from temp road development and use, these effects are considered insignificant and discountable.

Project Activity	Tasks	Tools or Equipment	Impact (stressor)	Exposure to Impact – proximity, probability Yes or No and why	Response Yes or No If yes, what is likely response	Effect If response, what is likely biological effect	Degree of effect
	Road closures	Dozer; hand crews to install gates or other barriers, spread seed	Noise. Restoration actions: soil disturbance/ beak-up soil compaction- soil ripping, establish water drainage features, reestablish native plants	Yes Same as above.	Yes – noise and ground disturbance to restore/rehab temp roads. Same response as above in terms of disturbance to birds but habitat will recover due to restoration actions.	Same biological effects as above. These effects could be minimized depending on the timing of road closures. Late summer – fall closures would avoid impacts to sage-grouse during the nesting and early brood-rearing periods which are the time periods most critical for chick survival and population recruitment.	Same rationale as above. The degree of effect is also less compared to the initial temp road construction and use because the duration to decommission roads is shorter, and restores habitat to previous condition.

Treatment units are contained within forested habitat, predominantly lodgepole pine stands. Some treatment units are located within designated critical habitat. Those treatments will not affect any designated critical habitat primary constituent elements (PCEs) but noise from those treatment activities may contribute to noise disturbance to Gunnison sage-Grouse in adjacent sagebrush habitat. Noise from road use through Gunnison sage-grouse breeding habitat and lodgepole pine treatment activities in designated critical habitat, and the potential risk of cheatgrass and other invasive plants are stressors with potential to be caused or influenced by the project.

Research indicates that ground disturbing activities and unclean equipment contributes to the spread of invasive plants. Integrated weed prevention and management measures not only contribute to Gunnison sage-grouse conservation, but contribute to better resource management in general. The Wilder-Highlands Mountain Pine Beetle Response Project interdisciplinary team recognizes this risk factor, and built invasive weed prevention and management design features as part of the project design. These are described in the Project Description, under Range and Invasive Weeds. These tier to applicable integrated weed management conservation measures from the Gunnison Basin Gunnison Sage-Grouse Candidate Conservation Agreement (USDI BLM et al. 2013).

The action area of 0.5 mile distance from temporary roads and haul roads and 1 mile from treatment units is based on noise impact to the Gunnison Sage-grouse. Noise from project activities can alter wildlife behavior in many different ways. These anthropogenic noises have the potential to muffle the sound of grouse breeding calls and may also disrupt nesting grouse within 4 miles of known lek site locations (Patricelli, et al. 2013). In addition, noise can mask the sound of predators putting females and their chicks more at risk in noisy environments (Patricelli et al 2013). Noise can also drown out the communication between the adult female and her chicks (Patricelli et al 2013). The action area distances into designated critical habitat from roads and treatment units is a conservative distance, used to fully

capture the extent of potential noise impacts. Based on the noise assessment (**Appendix A**), the distances at which project noise attenuates back to baseline noise levels is less.

The proposed temporary roads and use of existing roads as haul routes are not expected to cause sage-grouse mortality, due to slow vehicular speeds; nor further impair habitat connectivity, or further decreased habitat effectiveness because there will be no actions taken that would remove habitat or reduce habitat quality on haul roads (existing open public roads), and temporary roads occur on the periphery of the critical habitat designation mostly in forested habitat and in the forest-sagebrush interface. The main effect will be the potential for increased noise disturbance above background noise levels during periods of use. Design features are incorporated into the proposed action to prevent and treat noxious and invasive weeds, and avoid disturbances during the winter and lek (mating) season. The project activities will not disturb Gunnison sage-grouse during the lek season nor during the winter due to the lek season and big game winter range timing restrictions included in the project Design Features.

The potential effects will overlap the nesting, brood-rearing, and summer-late fall life history periods, with the effects expected to be fully contained within the Gunnison sage-grouse action area.

Table 10. Gunnison Sage-Grouse Sensitive Life History Chart in Relation to the Project Timing Restriction and Project Implementation

Life History	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Breeding (lek attendance)			—		—							
Nesting			—				—					
Brood-rearing ¹				—					—			
Molt												
Female					—					—		
Male					—				—			
Winter ²			—							—		
Project Timing Restriction												
Project Implementation												

Grey denotes peak activity.

— Dashes indicate range of activity.

¹During the first two to three weeks after hatching, chicks require a protein diet of insects; afterwards, in addition to insects, they begin to eat plant material consisting of succulent forbs. Habitat quality, food availability, and predation are key factors influencing chick survival.

Grey crosshatch denotes early brood-rearing period for the majority of hens with broods.

²During this time period, sagebrush is used exclusively for food and cover.

Conservation Measures Incorporated into the Project

- Project implementation will not occur during the lek season, March 15 – May 15.
- Integrated weed prevention practices (*Included in the project Design Features*);
- Habitat reclamation employed for any ground disturbance (closure of temporary roads, reseeding, and weed monitoring and weed eradication, to minimize establishment of invasive weeds and to accelerate restoration of habitat function (*Included in the project Design Features*); and
- Project design features incorporated into the project design include no winter activities to prevent impacts to big game on winter range from December 1 – April 15. This measure will also prevent impacts to wintering Gunnison sage-grouse.

Determinations of Effect and Rationale

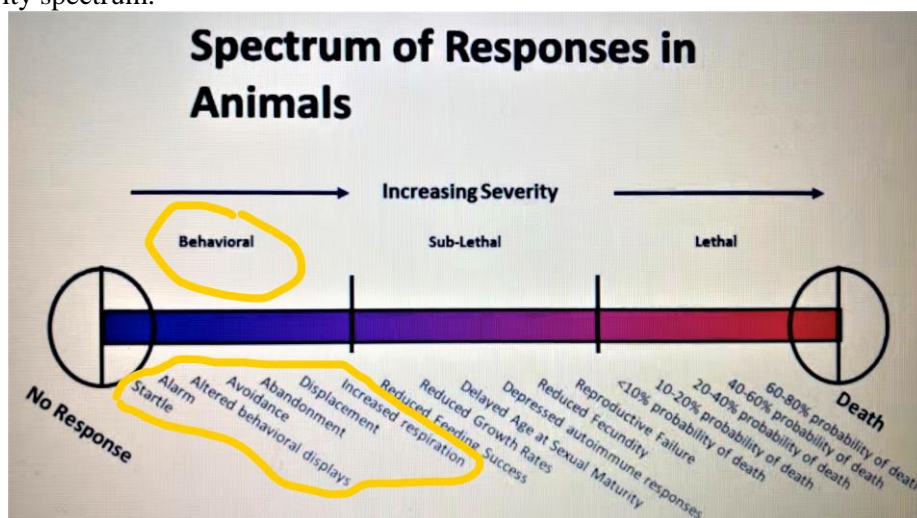
The proposed action **May affect** the Gunnison sage-grouse due to:

- Sage-grouse may be temporarily disturbed and displaced due to human activity and noise.

- Noise levels will be above background noise within the action area. Noises that exceed 10 dBA above background noise is considered disruptive activities not only around leks, but also in proximity to nesting, brood rearing, and foraging sites (Patricelli et al 2013).
- Increase anthropogenic noise can negatively affect sage-grouse by increasing physiological stress, changes in behavior, potential to muffle the sound of grouse breeding calls and may also disrupt nesting grouse within 4 miles of known lek site locations (Patricelli, et al. 2013). In addition, noise can mask the sound of predators putting females and their chicks more at risk in noisy environments (Patricelli et al 2013). Noise can also drown out the communication between the adult female and her chicks (Patricelli et al 2013, Parris 2016).
- Intermittent noise may be more disturbing to sage-grouse than a relatively continuous noise (Patricelli et al 2013, Blickley et al 2012).

The proposed action is **not likely to adversely affect** the Gunnison Sage-grouse because:

- The effects are expected to be insignificant and/or discountable (unmeasurable, and would not reach the level of take) due to occurrence in the periphery of Gunnison sage-grouse designated critical habitat, primarily in forested vegetation where Gunnison sage-grouse use is expected to be negligible.
- The majority of the project elements are outside the higher probability areas where nesting birds would be most likely to occur (Figure 3 – Aldridge et al 2011). Road 743 does go through high probability nesting habitat and will be used as a haul road. Increased noise from log truck traffic has the potential to affect birds, and will add temporarily to the current baseline of road use.
- Sage-grouse are unlikely to be present within treatment units and on the majority of temporary roads where ground disturbing activities may occur due to the forested cover.
 - The proposed action would not destroy or adversely modify Gunnison sage-grouse critical habitat.
 - The treatment units and majority of temporary roads are within forested habitat. Although some of them occur within the designated critical habitat polygon, Gunnison sage-grouse are not occupying the forested portions.
- The project activities are not expected to cause sage-grouse mortality. Rather, within a spectrum of possible animal responses ranging from no response to death, the effects analysis indicates responses fall within the behavioral, low severity spectrum and not the sub-lethal or lethal severity spectrum:



- The project will be implemented outside the lekking and breeding season (March 15 – May 15).

- Project design features, including the lek season and big game winter range timing restrictions, will prevent impacts during those time periods. Design features and conservation measures will also prevent and treat noxious and invasive weeds.

Designated Critical Habitat

The proposed action **May affect** the Gunnison sage-grouse designated Critical Habitat due to:

- Ground disturbing activities, temporary roads, will occur within designated Critical Habitat PCEs 2 (Breeding habitat) and 3 (Summer-late fall habitat).

The proposed action is **not likely to adversely affect** designated Critical Habitat because:

- The effects are expected to be insignificant and/or discountable due to occurrence on the periphery of habitat and primarily within forested habitats.
- Any anticipated habitat impacts within the critical habitat are not expected to impact the primary constituent elements (PCEs) because they will occur in coniferous and mixed coniferous-aspen forested areas or along the forest-sagebrush interface where Gunnison sage-grouse are unlikely to use habitat.
- Conservation measures will be applied to prevent and treat noxious and invasive weeds.

Cumulative Effects

The project will add cumulatively to the Canada lynx and Gunnison sage-grouse baseline in terms of a slight increase in the amount of habitat temporarily affected from the project activities. The cumulative effects of the project activities combined with existing uses in the action area (human uses of roads, recreation, livestock grazing and activities associated with private land inholdings and residences) may influence both species use of the landscape by temporarily causing area avoidance within and/or adjacent to the project activities or influence animal distribution and the timing of movements within the affected landscape. Sagebrush habitat will be negligibly affected along the periphery of designated critical habitat within or near forested vegetation where little or no Gunnison sage-grouse use is expected.

When combining the direct and indirect effects of the proposed activities with the past, present, and reasonably foreseeable nonfederal activities in the action area, it is unlikely that the proposed action would add cumulatively to existing impacts on the lynx or to the Gunnison sage-grouse to the point that an individual lynx or Gunnison sage-grouse or its home range would be adversely affected. This rationale is based on the temporary nature of the proposed project, and the location of the project on the landscape occurring on the periphery of the ecosystems associated with each species where the habitat is marginal for lynx (due to the low percent of spruce-fir in stands [0 – 10%], as reflected in Table 5) and Gunnison sage-grouse (due to the amount of forested habitat within the periphery of the designated critical habitat designation where project activities occur).

A low percent of lynx habitat will be affected when considering the amount of lynx habitat available in the Fossil Ridge LAU (as reflected in Tables 3 and 8). The project will convert up to 231 acres of suitable lynx habitat to an unsuitable condition (stand initiation structural stage), increasing unsuitable habitat from 0% to 0.63% of the total lynx habitat in the Fossil Ridge LAU. The proposed action will not reduce lynx functionality or habitat connectivity within the effected LAU since habitat conversion to an unsuitable condition will be negligible at the scale of the LAU. Cumulative habitat effects of the project towards the VEG S1, S2, S5 and S6 caps under the SRLA are reflected in Table 6.

There are 1,563 acres of lynx habitat on non-federal land within the Fossil Ridge LAU, which includes the Gunnison Highlands community where some of the proposed treatments will occur. Treatments on the Gunnison Highlands properties will reduce habitat quality on up to 153 acres and will convert up to 51

acres to an unsuitable condition. Other than the proposed vegetation management treatments on the Gunnison Highlands private property described in this BA, there are no other known reasonably foreseeable future actions on non-federal lands that would add to the effects of the project.

Responsibility for a Revised Biological Assessment

This Biological Assessment was prepared based on presently available information. If the action is modified in a manner that causes effects not considered, or if new information becomes available that reveals that the action may impact endangered, threatened, or proposed species in a manner or to an extent not previously considered, a new or revised Biological Assessment will be required and Section 7 consultation will need to be reinitiated.

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Appendix A – Noise Assessment

Noise Sources

Typically construction noise has point source noise (noise associated with a source that remains in place – WDOT 2017. Construction Noise Impact Assessment). However, noise from a single traveling vehicle such as log haul trucks associated with project activities, is also considered a point source noise (WDOT 2017. Construction Noise Impact Assessment). Construction point source noise is typically measured by maximum decibel levels (L_{\max} – WDOT 2017. Construction Noise Impact Assessment in reference to Harris 1991).

Noise Path Reduction Factors

Topography aids in noise attenuation and helps minimize noise as it travels over rolling hills, vegetation, and soil to the top of the nearby mesas within occupied habitat (Patricelli et al 2013)

Hard vs Soft Site

- Hard site is where noise travels away from a source over a flat hard surface such as water, concrete or hard-packed soil (WDOT 2017. Construction Noise Impact Assessment).
- Soft site is when ground cover or unpacked earth exist between the source and receptor in which the ground becomes absorptive of noise energy (WDOT 2017. Construction Noise Impact Assessment). Soft site condition is what will be considered for project analysis.

Ambient or Background Sound Conditions

- Ambient sound level is the total of all sources in a specific area not including anthropogenic sources (WDOT 2017. Construction Noise Impact Assessment)
- Background sound level is a combination of sound from all sources including anthropogenic sources (such as bird calls, wind, and rainfall). Normally background sound level is the chosen condition as baseline for evaluating construction noise impacts based on existing site conditions (WDOT 2017. Construction Noise Impact Assessment).

Noise Generated for Temporary Roads, Tree Hauling, and Treatment Units

Average maximum noise levels at 50 ft from construction equipment

Log Truck: 76 L_{\max} at 50 ft

Dozer: 82 L_{\max} at 50 ft

Skidder: 82 L_{\max} at 50 ft

Feller buncher: 85 L_{\max} at 50 ft

Chainsaw: 84 L_{\max} at 50 ft

Chipper/mulcher: Unknown

Helicopter: 98 L_{\max} at 50 ft (estimated based on: https://www.fs.fed.us/t-d/programs/im/sound_measure/helo_results.shtml)

Unknown: Confirmed noise levels at 50 feet from these types of equipment was not known at the time of writing this BA. This analysis is based on available noise data and believed to capture the extent of noise impacts.

Rules for Decibel Addition

Rules for combining noise levels:

When two decibel values differ by:

0 or 1 dBA

2 or 3 dBA

4 to 9 dBA

Add the following to the higher decibel value:

3 dBA

2 dBA

1 dBA

10 dBA or more
Source: USDOT (1995)

0 dBA

To determine the combined noise level of all construction equipment operating together, the project biologist should find the three pieces of equipment with the loudest noise levels, add the two lowest levels together using the rules of decibel addition as is shown in the above table, then add the result to the third noise level using the same rules in the table.

Noise from log truck traffic on haul roads is 76 dBA at 50 feet – single source noise (log trucks will be the only type of equipment causing increased noise on haul roads)

Noise from temporary road construction and use includes a dozer and log trucks. The combined noise level for temporary roads is **83 dBA** at 50 feet ($82 - 76 = 6$; therefore 1dBA is added to 82 dBA, resulting in a combined noise level of 83 dBA).

Noise levels from treatment activities (using skidder, feller buncher and chainsaw noise levels) is estimated to be about **89 dBA** at 50 feet ($84 - 82 = 2$; therefore 2 dBA is added to 84 dBA, resulting in 86 dBA; then add 86 dBA to the next loudest piece of equipment: $86 - 85 = 1$; therefore 3 dBA is added to 86 dBA, resulting in a total noise level for all equipment combined of 89 dBA. If a **helicopter** is used to remove logs, noise levels will be equivalent to the helicopter noise level estimated at **98 dBA**.

Extent of Noise and Defining the Noise Element of the Action Area.

Background sound level at project location and action area = 40 dBA (defined by EPA (1978) in which rural areas being the quietest have sound levels between 35 to 40 dBA).

Construction Noise Levels at a Distance of 0.5-mile (WDOT 2017. Construction Noise Impact Assessment)

$$L_{\max} = \text{Construction } L_{\max} \text{ at 50 ft} - 25 * \text{Log}(D/D_0)$$

Where L_{\max} = highest A-weighted sound level occurring during a noise event during the time that noise is being measured.

At 50 feet = the reference measurement distance (standard is 50 feet)

D = the distance from the noise source

D_0 = the reference measurement distance (50 feet in this case)

Project Activities at **temporary road locations** – Project-related noise is estimated at 83 dBA for temporary roads in a shrubland/forested site (soft site). For a Gunnison Sage-grouse nest located at least 2,640 feet (0.50-mile) from the temporary roads, **expected construction noise level would be:**

$$L_{\max} = \text{Construction } L_{\max} \text{ at 50 feet} - 25 * \text{Log}(D/D_0)$$

Where L_{\max} = 83 dBA

D = 2,640

D_0 = the reference measurement distance (50 feet in this case)

L_{\max} = 83 dBA at 50 feet – $25 * \text{Log}(2,640/50)$

L_{\max} = 83 dBA at 50 feet – $25 * \text{Log}(52.8)$

L_{\max} = 83 dBA at 50 feet – 43.06

L_{\max} = 39.94 dBA

Project Activities at **treatment unit locations** – Project-related noise is estimated at 89 dBA for treatment units in a forested/shrubland site (soft site). For a Gunnison Sage-grouse nest located at least 2,640 feet (0.50-mile) from the treatment units within or adjacent to designated critical habitat, **expected construction noise level would be:**

$$L_{\max} = \text{Construction } L_{\max} \text{ at 50 feet} - 25 * \log(D/D_0)$$

Where $L_{\max} = 89$ dBA

$D = 2,640$

D_0 = the reference measurement distance (50 feet in this case)

$L_{\max} = 89$ dBA at 50 feet $- 25 * \log(2,640/50)$

$L_{\max} = 89$ dBA at 50 feet $- 25 * \log(52.8)$

$L_{\max} = 89$ dBA at 50 feet $- 43.06$

$L_{\max} = 45.94$ dBA

This noise level of 45.94 dBA at 0.5 mi from treatment activities is above estimated baseline ambient noise levels by 5.94 dBA. This is further analyzed below to determine distance at which this would attenuate to baseline noise levels.

Project activities **along haul roads** – Project-related noise from log trucks is estimated at 76 dBA in a shrubland/forested site (soft site). For a Gunnison Sage-grouse nest located at least 2,640 feet (0.5-miles) from the project activities, **expected construction noise level would be:**

$$L_{\max} = \text{Construction } L_{\max} \text{ at 50 feet} - 25 * \log(D/D_0)$$

Where $L_{\max} = 76$ dBA

$D = 2,640$

D_0 = the reference measurement distance (50 feet in this case)

$L_{\max} = 76$ dBA at 50 feet $- 25 * \log(2,640/50)$

$L_{\max} = 76$ dBA at 50 feet $- 25 * \log(52.8)$

$L_{\max} = 76$ dBA at 50 feet $- 43.06$

$L_{\max} = 32.94$ dBA

Distance Construction Noise Attenuates to Background (WDOT 2017. Construction Noise Impact Assessment)

To determine the distance point source construction noise will travel before it attenuates to the ambient/baseline sound level; the following equation was used:

$$D = D_0 * 10^{((\text{Construction Noise} - \text{Background Sound Level in dBA})/\alpha)}$$

Where D = the distance from the noise source

D_0 = the reference measurement distance (50 feet in this case)

$\alpha = 25$ for soft ground. *For point source noise, a spherical spreading loss model is used. These alpha (α) values assume a 7.5 dBA reduction per doubling distance over soft ground*

Project activities at treatment units – Noise from treatment unit activities is estimated at 89 dBA, with 40 dBA for background sound in a shrubland/forested site (soft site). **Construction noise will attenuate to the background sound level over soft ground at the following distance:**

$$D = D_o * 10^{((\text{Construction Noise} - \text{Background Sound in dBA})/\alpha)}$$

D_o = the reference measurement distance (50 feet in this case)

$$D = 50 * 10^{((89 - 40)/25)}$$

$$D = 50 * 10^{(49/25)}$$

$$D = 50 * 10^{(1.96)}$$

$$D = 50 * 91.2$$

D= 4,560 feet (about 0.86 miles)

Project activities at temporary roads – Noise from temporary road construction and use is estimated at 83 dBA, with 40 dBA for background sound in a shrubland/forested site (soft site). **Construction noise will attenuate to the background sound level over soft ground at the following distance:**

$$D = D_o * 10^{((\text{Construction Noise} - \text{Background Sound in dBA})/\alpha)}$$

D_o = the reference measurement distance (50 feet in this case)

$$D = 50 * 10^{((83 - 40)/25)}$$

$$D = 50 * 10^{(43/25)}$$

$$D = 50 * 10^{(1.72)}$$

$$D = 50 * 52.5$$

D= 2,624 feet (0.5 mile)

Project Activities along log truck haul routes – Project-related noise from log trucks is estimated at 76 dBA in a shrubland/forested site (soft site). **Construction noise will attenuate to the background sound level over soft ground at the following distance:**

$$D = D_o * 10^{((\text{Construction Noise along Travel Routes} - \text{Background Sound in dBA})/\alpha)}$$

D_o = the reference measurement distance (50 feet in this case)

$$D = 50 * 10^{((76 - 40)/25)}$$

$$D = 50 * 10^{(36/25)}$$

$$D = 50 * 10^{(1.44)}$$

$$D = 50 * 27.54$$

D= 1,377 feet (about 0.26 miles)

Appendix B – Species List - Colorado Ecological Services Field Office– (File Attached Separately)